MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for November, 1900, is based on reports from about 3,099 stations furnished by employees and voluntary observers, classified as follows: regular stations of the Weather Bureau, 159; West Indian service stations, 13; special river stations, 132; special rainfall stations, 48; voluntary observers of the Weather Bureau, 2,562; Army post hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Railway Company, 96; Canadian Meteorological Service, 32; Mexican Telegraph Service, 20; Mexican voluntary stations, 7; Mexican Telegraph Company, 3. International simultaneous observations are received from a few stations and used, together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Hawaiian Government Survey, Honolulu; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Mr. Maxwell Hall, Government Meteorologist, Kingston, Jamaica; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; and Commander Chapman C. Todd, Hydrographer, United States Navy.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is 157° 30′ or $10^h\ 30^m$ west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

On the morning of November 9 the following special bulletin was issued by the Chief of the Weather Bureau:

> The first well-marked cold wave of the season covers the middle-western and northwestern States with a reported minimum temperature of 12° below zero at Huron, S. Dak. Freezing weather is reported to southern Kansas and southern Missouri, and snow has fallen as far south as the Ohio River. To-night the line of freezing temperature will extend over Arkansas and Tennessee, and heavy frost will occur in central and north parts of the middle and east Gulf and South Atlantic States, excepting Florida.

On the morning of the 9th heavy frost was reported in the middle and east Gulf and South Atlantic States as far south as Meridian, Miss., Montgomery, Ala., and Macon and Savannah, Ga. Light frost occurred in extreme northern Florida the morning of the 10th, and generally along the Gulf coast from Corpus Christi, Tex., to Tampa, Fla., the morning of the 13th. In each instance warnings were distributed the day before the occurrence of frost in the districts visited.

The extreme northwest was visited by several periods of severe cold, which failed, however, to extend over considerable areas. The lowest temperature of the month in that section was reached the morning of the 20th, when a minimum of 30° below zero was noted at Havre, Mont., and the line of zero temperature was traced over western South Dakota. The occurrence of these low temperatures was covered by the daily forecasts.

The Great Lakes were visited by four general storms. The first of these crossed the upper lakes on the 1st and caused wind velocities of 40 to 50 miles an hour on the lower lakes. From the 7th to the 9th the weather was stormy over the Lake region, but this period was not marked by gales of exceptional severity. During the 12th and 13th high winds and snow prevailed over the lakes. A storm which developed great intensity swept the Lake region on the 20th and 21st; over the lower lakes the maximum wind velocities on the 21st ranged from 60 to 80 miles an hour. During the 27th a storm moved northeastward over the Atlantic coast States, causing violent gales over the lower lakes and along the Atlantic coast.

Notwithstanding the ample warnings that were issued the lake storms of the month resulted in a number of casualties.

The storm of the 12–13th passed eastward to the St. Lawrence Valley and was followed on the 14th by snow from northern New York over the Lake region and the Northwest. In western New York the snowfall of the 14th and 15th was sufficiently heavy to delay railway traffic.

The period from the 17th to the 20th was one of unusual cold and heavy snow in the northern Rocky Mountain districts, and during the 20th and 21st the snow area extended over the middle Plateau region. The Atlantic coast and lower lake storm of the 26th and 27th was attended by freshets in the streams of New York, and by heavy snow in the northern part of that State.

On the Pacific coast the first important storm of the month appeared on the 16th, and this storm inaugurated a week of rain and high winds along the entire Pacific coast. In parts of California the heavy rains resulted in damaging floods.

In the north Pacific coast States gales were attended by snow and severe cold. At Vancouver, B. C., an unprecedented fall of snow for the season was reported. The gales, the snow and rain, and the temperature conditions were accurately forecast by the Weather Bureau.

An unusual and notable feature of the month was the occurrence of tornadic storms on the 20th in northern Arkansas, northern Mississippi, and eastern and middle Tennessee. These storms developed in the south quadrants of a general storm, the center of which moved during the 20th from Oklahoma to central Illinois, and passed thence over the Lake region during the 21st. The rain and the lake gales which attended this storm were forecast. As regards the tornadic storms referred to it is not possible, even in the presence of conditions which are recognized as being most favorable to their origin, to determine whether storms of this class will actually develop; and if it were possible to arrive at this determination the area, in any part of which their development is equally favored, is so great that the locality or even the State in which the tornadoes will occur can not be defined.

SPECIAL FORECASTS.

The only long-range forecasts of the month were made for election day, November 6. The first of these was issued November 3, and was worded as follows:

Present conditions point to fair weather and moderate temperature on Tuesday, November 6, over all districts east of the Mississippi River. From the Mississippi River to the Pacific coast present conditions are also favorable for fair weather, except on the middle and north Pacific coasts, where there may be rain.

This was followed on the 4th by the following:

For the first time in ten days the weather map shows a clear sky over the whole region from the Pacific to the Atlantic, except over a small area on the middle Atlantic coast, where some rain is falling as a result of a severe storm, the center of which is off Hatteras. The pressure is high over the western half of the country. These conditions will surely give clear, fine weather and pleasant temperature in all States on Monday, except possibly showers on the immediate Atlantic coast line. While it is possible for a storm to develop somewhere in this broad area by Tuesday, the conditions are unusually favorable for the continuation of fine weather for Monday over and throughout Tuesday.

On the morning of the 6th the prevailing weather conditions of the country were summarized as follows:

It is seldom that any day opens without a drop of rain falling anywhere within the area of the United States. Such is the remarkable condition this morning. With the exception of cloudiness over southern Wisconsin, northern Illinois, and eastern Iowa, the sky is clear with pleasant temperature everywhere. The showery condition which yesterday covered New York and New England has moved away as was expected, and all portions of New York and New England are certain to have fine weather during the day. The cloudiness previously referred to as being in Iowa and contiguous States is the result of a storm forming over western Iowa, which will probably result in the beginning of precipitation late to-night or to-morrow in Iowa, the central Mississippi valley and upper Lake region, but the weather will doubtless remain fair until after the closing of the polls.

On the morning of the 9th the following special forecast was telegraphed to Portland, Me., Boston, New York, Philadelphia, Baltimore, and Norfolk:

Severe gales setting in from southeast and going to west and northwest will be encountered along the steamer tracks west of Newfoundland to-night, and over and near the Grand Banks Saturday.

During the 9th heavy gales prevailed along the middle Atlantic and New England coasts, and the wind increased to a strong gale off the Nova Scotia coast during the night of the 9th. Unusually severe south shifting to west gales continued over Nova Scotia during the 10th, and south gales set in over Newfoundland and the Grand Banks, shifting to westerly by night.

The Yarmouth Steamship Company's side-wheel steamer *City of Monticello* struck on a reef at the entrance of the Bay of Fundy the morning of the 10th and sank. The passengers and crew numbered 37, and all except 4 were drowned. The steamer left St. John, N. B., at 11 a. m. of the 9th bound for Halifax, N. S. During the day and night the wind increased in force. When off Chegoggin Point she struck a reef and was soon completely wrecked on the rocks.

On the morning of the 26th, when a storm of marked intensity was central over the interior of the Middle Atlantic States, the following special forecast was telegraphed to Portland, Me., Boston, New York, Philadelphia, Baltimore, and Norfolk, and published on the daily weather maps issued at those places:

Severe gales will shift to northwest off the middle Atlantic coast today and off the New England coast to-night. Dangerous southeast gales will shift to westerly over the Banks of Newfoundland Tuesday.

By the morning of the 27th the storm center had advanced to the south Nova Scotia coast, and by the following morning had passed to the east of Newfoundland.

On the whole the month was marked by exceptionally severe weather along the transatlantic steamship tracks.

On the 25th and 26th the streams of the Ohio Valley were swollen by heavy rains.

At Pittsburg, Pa., the Weather Bureau issued a flood warning at 2 p. m. of the 26th, announcing a 25-foot stage, or higher, by midnight. The night of the 26th a second warning was issued for a 28-foot stage by noon of the 27th. The maximum stage, 27.7 feet, was reached at 10 a. m., of the 27th.

General attention was given to the warnings, and property to the estimated value of at least $1,000,000, was saved by removal to places of safety before the crest of the flood reached Pittsburg.

CHICAGO FORECAST DISTRICT.

No very severe storms occurred in the upper Lake region. Storm warnings were ordered in advance of the upper lake disturbances of 1st, 3d, 8th, 11th, and 12th, the warnings of the 12th being continued forty-eight hours, and at some stations for a longer period. The stormy weather which continued from the 17th to the 20th was amply covered by warnings, and on the morning of the 24th warnings were issued for the greater part of Lakes Michigan and Huron on account of a storm in the lower Mississippi Valley which moved eastward and northward, causing high winds over the southern parts of the lakes.

No cold waves swept the entire district. Warnings were, however, issued generally in advance of marked falls in temperature.—*H. J. Cox, Professor.*

SAN FRANCISCO FORECAST DISTRICT.

On November 14 conditions were such as to warrant the forecast of rain for northern California and threatening weather in southern California, which forecast was continued on the 15th. By November 16 the storm, which was destined to be noteworthy, was fairly in upon the north Pacific coast, and heavy rain was reported from San Francisco northward. On the morning of the 16th storm warnings were displayed from San Francisco to Eureka and all southern seaports were advised of a storm off the Washington coast. Rain was forecast for southern California the morning of the 16th. By November 17 heavy rains had fallen from San Diego to Neah Bay. The value of this rain was almost beyond estimation. Rain forecasts were continued Sunday and Monday, and north and east bound travelers were specially warned of

low temperatures and snow along their routes. On the 20th forecasts of high winds were sent to Nevada and Utah. On November 21 the morning forecast for southern California was "heavy rain this afternoon, to-night, and Thursday, with snow in the mountains and dangerously high southerly winds." High winds were also forecast for other parts of the district. Shipping and railroad interests were advised of heavy rains and high southerly winds. The forecasts were fully justified. The clearing weather which followed the storm was also accurately forecast.—*A. G. McAdie, Forecast Official.*

PORTLAND, OREG., FORECAST DISTRICT.

Following the storm of the 1st an unusually long period of fine weather prevailed, which terminated in a severe cold spell, attended by snow and blustering northeast winds that overspread the North Pacific States the night of the 17th and continued until the 22d. Freezing temperatures were experienced to the coast line for three days, and east of the Cascade Mountains zero temperature was reported at Spokane and Walla Walla. Both the cold weather and snow were accurately forecast, as was also the break to warmer, which occurred several days later. The warnings of cold were the means of saving several big shipments of potatoes that otherwise would have been frozen. Marine interests were kept fully advised of the approach of gales and high winds.—*E. A. Beals, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

During the month there were charted eleven highs and sixteen lows. A brief description of their movements and more prominent characteristics is given herewith.

Highs.—For the first time since May, 1900, with the exception of a portion of July, the highs exhibited a southeastward tendency, and the paths of a majority of them at times reached below the fortieth parallel. Nos. I, III, VII, and XI originated in the extreme central west, but pursued widely different paths. No. I moved from the Indian Territory northeastward to Ontario, and thence along a somewhat devious path to the Atlantic Ocean by way of Cape Breton Island. No. III originated in southeastern Wyoming and moved almost due southward through central Texas into the Gulf of Mexico. No. VII moved from the Kansas River Valley to West Virginia in twenty-four hours, and there disappeared, while No. XI maintained a fairly direct eastward movement from southeastern Wyoming to the Virginia coast. No. II first appeared on the Washington coast, moved eastward to North Dakota, and thence south-southeastward through Missouri and Mississippi into the Gulf of Mexico. No. IV moved from Columbia, N. W. T., to the Saskatchewan Valley, thence southeastward to the lower Ohio Valley, and thence eastward off the southern New Jersey coast. No. V followed much the same path as No. IV. Nos. VI and VIII moved across the extreme north from Alberta to the Atlantic Ocean. No. X was first noticed over northern Lake Superior, and from that section eastward followed very nearly in the paths of Nos. VI and VIII.

The characteristic winter type of high prevailed over the Plateau region except from the 14th to the 22d, inclusive, continuing at the close of the month.

Lows.—The lows were numerous and fairly regular in movement. Nos. I, V, XIV, XV, and XVI, moved eastward over the extreme north, No. I coming in over the Oregon coast. No. XVI dissipated in western Ontario, while the remaining three passed out the St. Lawrence Valley. During its progress No. V dipped down into the southern portion of the upper Lake region, afterward resuming its easterly course. Nos. XI, XII, and XIII, originated in the central Rocky Mountain region, Nos. XI and XII passing into the Atlantic by way of the St. Lawrence Valley and Nova Scotia. No. XIII first traveled southeastward through the Southern States, turning northeastward after reaching central Alabama. It passed into the ocean off the southern New Jersey coast, and was afterward noted at Halifax, N. S., Sydney, C. B. I., and St. Johns, N. F. No. X originated in southwestern Montana, and moved down the eastern slope of the Rocky Mountains to central Texas, where it disappeared. Nos. IV and IX originated in the middle Mississippi Valley, the former moving to eastern Lake Erie, and thence south-southeastward to the Virginia coast, and the latter to the Atlantic Ocean just north of latitude 45°. No. VI was a local disturbance of great intensity that moved from southeastern New York through New England to the country north of the Gulf of St. Lawrence. Nos. II and VIII originated in the south Atlantic States, and both were last noticed in the vicinity of Bermuda.

From the morning of the 15th to the evening of the 19th a low of decided character was persistent near the Oregon, Washington, and British Columbia coasts, the barometer readings ranging in the neighborhood of 29.50 inches, and the depression extending into the north and middle Plateau region. It began to move southward during the night of the 19th, disappearing off the California coast during the night of the 20th.—*H. C. Frankenfield, Forecast Official.*

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	1, a. m.	34	96	4, a. m.	46	60	2,500	3.0	833	34.7
II	6, a. m.	47	123	10, p. m.	30	88	2,440	4.5	542	22.6
III	8, p. m.	48	122	12, p. m.	28	98	2,745	4.0	686	28.6
IV	12, a. m.	51	120	15, a. m.	40	75	2,725	3.0	908	37.8
V	14, a. m.	53	109	17, p. m.	41	70	2,400	3.5	686	28.6
VI	16, p. m.	54	114	20, a. m.	48	54	2,750	3.0	917	38.2
VII	21, a. m.	39	95	22, a. m.	38	80	800	1.0	800	33.3
VIII	22, p. m.	50	108	25, p. m.	46	60	2,265	3.0	755	31.5
IX	23, p. m.	50	110	29, a. m.	36	84	2,775	4.5	617	25.7
X	26, p. m.	48	85	29, p. m.	46	60	1,345	3.0	448	18.7
XI	28, p. m.	42	105	1, a. m.*	37	76	1,715	2.5	686	28.6
Sums	....	....	....	....	....	....	24,460	35.0	7,878	328.3
Mean of 11 paths	....	....	....	....	....	....	2,224	......	716	29.8
Mean of 35 days	....	....	....	....	....	....	....	......	699	29.1
Low areas.										
I	1, p. m.	45	117	4, p. m.	48	68	2,825	3.0	942	39.2
II	3, a. m.	34	82	5, p. m.	32	65	1,075	2.5	430	17.9
III	5, a. m.	45	73	6, a. m.	46	60	700	1.0	700	29.2
IV	6, a. m.	41	96	8, a. m.	37	76	1,400	2.0	700	29.2
V	7, p. m.	54	114	12, a. m.	48	68	2,490	4.5	553	23.0
VI	8, a. m.	41	74	10, a. m.	48	68	650	2.0	325	13.5
VII	11, p. m.	48	85	13, a. m.	48	68	900	1.0	900	37.5
VIII	11, p. m.	32	81	13, a. m.	32	65	1,000	1.5	667	27.8
IX	12, p. m.	43	91	14, p. m.	46	60	1,700	2.0	850	35.4
X	13, p. m.	47	112	15, a. m.	31	101	1,325	1.5	883	36.8
XI	17, a. m.	41	107	21, p. m.	48	68	2,425	4.5	539	22.5
XII	21, p. m.	40	105	24, a. m.	48	54	2,675	2.5	1,070	44.6
XIII	21, p. m.	41	111	28, a. m.	48	54	3,840	6.5	591	24.6
				25, a. m.	40	80	2,325	3.5	664	27.7
XIV	25, a. m.	53	121	29, a. m.	45	80	1,600	4.0	400	16.7
XV	27, p. m.	54	114	1, a. m.*	46	78	1,800	3.5	514	21.4
XVI	30, a. m.	54	114	2, p. m.*	47	85	1,550	2.5	620	25.8
Sums	....	....	....	....	....	....	30,280	48.0	11,348	472.8
Mean of 17 paths	....	....	....	....	....	....	1,781	......	667	27.8
Mean of 48 days	....	....	....	....	....	....	....	......	631	26.3

* December.

RIVERS AND FLOODS.

The Mississippi River from its source to the mouth of the Illinois River was somewhat lower than during October, 1900; from the mouth of the Illinois to the mouth of the Ohio there was but little change, while below the mouth of the Ohio stages

were from 2 to 3 feet higher, the water coming from the Ohio River on the earliest, and again on the latest days of the month. As compared with the corresponding month of 1899, the average stage for the entire river shows an increase of about 4 feet, which must be attributed mainly to the mildness of the temperature over the northern portion and the heavy rains over the Ohio watershed. The water from the Chicago Drainage Canal through the Illinois River also contributed, to a certain extent, toward the increase of the water level. The precise effect which this canal is exercising upon the stages of the Mississippi River can not be determined with any degree of exactness until a series of observations from low water to flood stages has been obtained.

The Ohio River stages were much higher than in October, on account of the moderate flood of the latter part of that month, the crest of which did not pass Cairo, Ill., until November 3, and of another, of more decided proportions, during the latter days of November. This latter flood was caused by heavy rains over the Ohio watershed from the 24th to the 26th. Danger-line stages were reached above Wheeling, W. Va., except along the Allegheny River, where they were not quite so high. The proportionately lower stages below Wheeling may be attributed to the fact that the heavy rains came first from the southwest, causing a sharper flood plane, and a consequent increase in the velocity of the stream-flow over the lower river. By the time the rain had reached the upper basin the water below had largely run out. The same amount of water from a general rain, well distributed over the entire watershed, would have caused a decided flood along the whole length of the river. The following account of the flood in the upper Ohio is taken from the report of Mr. Frank Ridgway, official in charge of the Weather Bureau office at Pittsburg, Pa.:

The heavy rains of November 20 and 21 terminated a long period of drought over the Allegheny and Monongahela valleys. From 1 to more than 2 inches of rain fell on those dates, but they did no more than to saturate the dry soil and start the springs. The heavier rains that began four days later fell upon soil already saturated with moisture, and consequently nearly all of this water quickly found its way into the rivers. On the morning of the 26th the reports from the upper rivers showed that the heavy rains had filled all the streams and that they were rising rapidly. Hourly observations were ordered from noon to 6 p. m. When the 2 p. m. reports were received, showing that the upper rivers were rising from 1 to 2 feet an hour, warnings were immediately issued, through the departments of justice of Allegheny and Pittsburg, the press, and by telegraph and telephone, in all directions along the three rivers, to prepare for 25 feet or more of water by midnight. The river at this point (Pittsburg) passed the danger line of 22 feet about 9 p. m. and was rising about 1 foot an hour. Later reports from the upper rivers justified this office in sending out a second warning at midnight that a stage of at least 28 feet would be reached by noon of the 27th, and that all movable property liable to damage by water at a 28-foot stage should be removed to places of safety.

This flood was unprecedented at Pittsburg for the time of the year, with the possible exception of the "pumpkin flood" of November, 1810.

General attention was given the warnings, and it is estimated that over $1,000,000 worth of property was saved by removal to places of safety before the crest of the flood waters reached the city, which was twenty hours after the first warning was issued. The highest stages reached at the city were 27.7 feet on the Monongahela River, 28.2 feet on the Allegheny River, and 25.6 feet on the Ohio River, and all occurred between 9:30 and 11 a. m. An unusual deficiency of rainfall had necessitated the suspension of navigation throughout the entire summer and autumn. It can therefore be readily seen what this rise meant to the river interests of Pittsburg. During the last week of November nearly 150,000,000 bushels of coal were shipped by boat to southern markets, and at the same time the construction work of the season came to an end.

The flood in the lower Ohio was more moderate, and the following report thereon was made by Mr. P. H. Smyth, official in charge of the Weather Bureau office at Cairo, Ill.:

A general rise in the Ohio River was in progress on November 20, 1900, due to general rain over the entire watershed. For five days subsequent to the initial rise, heavy rain continued quite general over the watersheds, which kept the lower river rising until December 3–4, 1900. The rise in the lower Ohio was augmented also by rises out of the Cumberland and Tennessee rivers.

The maximum stage reached at Evansville was 33.6 feet on December 3, and the maximum at Cairo was 32.6 feet on December 4. The maximum stage predicted for Evansville was between 34 and 35 feet, and for Cairo between 32.5 and 33 feet.

So far as learned no material damage resulted from the high stage. Warnings were sent out well in advance of the flood, and what property was in danger was removed to places of safety, as far as practicable.

Mr. Charles M. Spencer, Mount Vernon, Ind., in reporting on the high stage at that point, writes as follows:

"Information was posted on bulletin board, published in daily papers, and sent to neighboring post offices. No property was in danger, except logs and small amount of corn standing in fields. The logs were rafted and taken to mill, and the corn was cribbed. The approximate value of property protected was $25,000, all of which was practically saved."

Mr. Charles Carroll, Shawneetown, Ill., reports on the high stage as follows:

"Information sent to farmers in river bottoms, Saline River to New Haven, Ill., and sent to those on Kentucky side; also sent by mail to all offices in this vicinity where people are interested. Immediate action was taken to drive stock out of the bottoms, crops and other property protected or removed. Approximate value of property (crops and stock) protected, probably $600,000. Only a small amount, comparatively, of this was lost—some corn ungathered. Farmers having corn not gathered, at the news of the flood, called in assistance, trebled their forces, and saved by far the most of their crop. Such information is invaluable."

The rivers of the Atlantic system also rose considerably during the latter days of the month, owing to heavy rains from the same storm that caused the flood in the Ohio. The Susquehanna River at Wilkesbarre, Pa., reached a stage of about 25 feet, or 11 feet above the danger line, during the night of the 27th. Previous unpleasant flood experiences were wanting, however, as the two new bridges across the flats prevented the suburbs in that section from becoming isolated. The rise was not so marked in the lower river and in the West Branch.

The James River rose 10 to 15 feet from the 25th to the 27th. A stage close to the danger line was reached at Richmond, Va., warning of which was issued on the 27th. Along the water front property liable to damage was removed to places of security, and no avoidable losses occurred.

Nothing of interest occurred along the rivers of Texas and the Pacific coast.

Floating ice was observed during the month in the Mississippi River as far south as Prairie du Chien, Wis., and in the Missouri as far as Omaha, Neb. The latter river closed entirely at Bismarck, N. Dak., on the 16th, and as far south as Sioux City, Iowa, on the 20th.

Navigation on the upper Mississippi was officially closed on the 20th.

The highest and lowest water, mean stage, and monthly range at 127 river stations are given in Table XI. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Rainfall is expressed in inches and temperature in degrees Fahrenheit.

Alabama.—The mean temperature was 55.2°, or 1.6° above normal; the highest was 86°, at Thomasville on the 3d, and the lowest, 23°, at Madison and Valleyhead on the 9th. The average precipitation was 3.88, or 0.46 above normal; the greatest monthly amount, 7.80, occurred at Opelika, and the least, 1.01, at Daphne.

The month was very favorable for all farm work; considerable plowing has been done and about the usual acreage has been sown to wheat, much of which has germinated and is in good condition; an increased acreage has been devoted to oats, some of which is up to good stands and growing nicely.—*F. P. Chaffee.*

Arizona.—The mean temperature was 56.9°, or 2.6 above normal; the highest was 97°, at Aztec on the 4th, and the lowest, 13°, at Flagstaff on the 12th. The average precipitation was 1.60, or 0.87 above normal; the greatest monthly amount, 7.87, occurred at Pinal Ranch, while none fell at Cochise, Gila Bend, and Pantana.—*L. M. Dey, Jr.*

Arkansas.—The mean temperature was 51.4°, or 0.7° above normal; the highest was 90°, at Camden on the 3d, and the lowest, 18°, at Pond on the 12th. The average precipitation was 4.28, or 0.25 above normal; the greatest monthly amount, 9.39, occurred at Lonoke, and the least, 1.79, at Arkansas City.

Wheat is coming up to good stands and is looking well; the acreage is smaller than last year, except in the northwest section where it is about the average. The hessian fly is doing some damage.—*E. B. Richards.*

California.—The mean temperature was 54.7°, or 2.5° above normal; the highest was 102°, at Irvine on the 11th, and the lowest, 4° below zero, at Bodie on the 27th and 28th. The average precipitation was 5.21, or 2.96 above normal; the greatest monthly amount, 18.91, occurred at Summerdale, while none fell at Mammoth Tank, Ogilby, and Salton.—*A. G. McAdie.*

Colorado.—The mean temperature was 37.9°, or 2.9° above normal; the highest was 85°, at Blaine on the 2d and 5th, and the lowest, 18° below zero, at Troutvale on the 29th. The average precipitation was 0.45, or 0.26 below normal; the greatest monthly amount, 2.43, occurred at Mancos, while none fell at Boxelder, Las Animas, and Blaine.—*F. H. Brandenburg.*

Florida.—The mean temperature was 64.5°, or 1.2° below normal; the highest was 92°, at Nocatee on the 2d, and the lowest, 27°, at Sumner on the 13th. The average precipitation was 1.31, or 0.77 below normal; the greatest monthly amount, 3.53, occurred at St. Andrews Bay, and the least, 0.10, at Clermont.—*A. J. Mitchell.*

Georgia.—The mean temperature was 55.8°, or 0.9° above normal; the highest was 86°, at Waycross on the 1st, 19th, and 21st, and at Mauzy on the 21st, and the lowest, 18°, at Dahlonega on the 9th. The average precipitation was 3.39, or 0.47 above normal; the greatest monthly amount, 6.61, occurred at Allentown, and the least, 1.25, at Allapaha.

The month, as a whole, was regarded as favorable to farming interests, and much wheat has been sown.—*J. B. Marbury.*

Idaho.—The mean temperature was 35.2°, or 0.3° below normal; the highest was 73°, at Garnet on the 3d, and the lowest, 20° below zero, at Kootenai on the 19th. The average precipitation was 1.51, or 0.39 below normal; the greatest monthly amount, 3.16, occurred at St. Maries, and the least, 0.39, at Forney.—*S. M. Blandford.*

Illinois.—The mean temperature was 41.2°, or 0.8° above normal; the highest was 83°, at St. John on the 22d, and the lowest, 2°, at Scales Mound on the 15th. The average precipitation was 2.92, or about normal; the greatest monthly amount, 6.52, occurred at Raum, and the least, 0.91, at Coatsburg.

The weather has, in general, been very favorable for the growth of wheat, and its average condition at the end of the month was excellent. The hessian fly has caused some damage; early sown wheat suffered more from the fly than later sown. Pastures are generally in fine condition and are still offering good feed for cattle. Meadows look green and have made good and healthy growth during the fall.—*M. E. Blystone.*

Indiana.—The mean temperature was 42.8°, or 1.5° above normal; the highest was 81°, at Mount Vernon on the 21st, and the lowest, 9°, at South Bend on the 16th. The average precipitation was 4.26, or 0.43 above normal; the greatest monthly amount, 9.15, occurred at Mount Vernon, and the least, 0.80, at Valparaiso.

Wheat is well stooled, deep rooted, and vigorous in growth; in most fields it covers the ground nicely, and in some it is rank. In the early sown fields the fly is apparently doing injury. Pastures and meadows were green at the close of the month and live stock was in good condition.—*C. F. R. Wappenhans.*

Iowa.—The mean temperature was 33.5°; the highest was 79°, at Galva on the 3d, and the lowest, 6° below zero, at Fonda on the 15th. The average precipitation was 1.06, or 0.36 below normal; the greatest monthly amount, 3.35, occurred at Danville, and the least, trace, at Glenwood and Primghar.

The unusual amount of cloudiness, fog, and misty weather retarded the corn harvest and kept the fields and roads wet and heavy, but the pastures were fine and there was abundant feed for stock.—*J. R. Sage, Director; G. M. Chappel, Assistant.*

Kansas.—The mean temperature was 41.9°, or 0.8° above normal; the highest was 90°, at Hoxie on the 1st and at Wallace on the 3d, and the lowest, 2° below zero, at Achilles on the 21st. The average precipitation was 0.56, or 0.36 below normal; the greatest monthly amount, 2.03, occurred at Columbus, while none fell at Gove, Scott, and Viroqua.

The weather was quite favorable for farm work. Wheat has grown rapidly and is generally in fine condition, though in the extreme northwest counties it has begun to show effects of the drought, and in Ottawa, Saline, Rice, and Cherokee counties there is some complaint of the hessian fly. It is being pastured to prevent stooling.—*T. B. Jennings.*

Kentucky.—The mean temperature was 47.0°, or 0.8° above normal; the highest was 83°, at Warfield on the 1st, and the lowest, 15°, at Maysville on the 15th. The average precipitation was 7.78, or 3.63 above normal; the greatest monthly amount, 11.84, occurred at Hopkinsville, and the least, 4.87, at Henderson.

Quite a serious drought existed over the State up to the 19th and winter wheat suffered considerably, the ravages of the fly being much more serious on account of the drought. The heavy rains from the 19th to the 26th greatly benefited the wheat crop, so that by the end of the month it was in fair condition.—*H. B. Hersey.*

Louisiana.—The mean temperature was 60.3°, or 2.2° above normal; the highest was 92°, at Lake Charles on the 1st and at Donaldsonville on the 21st, and the lowest, 22°, at Oxford and Robeline on the 12th. The average precipitation was 2.91, or 1.35 below normal; the greatest monthly amount, 8.11, occurred at Cheneyville, and the least, 0.48, at Paincourtville.

The weather was very favorable for harvesting such of the farm products as were yet in the field.—*W. T. Blythe.*

Maryland and Delaware.—The mean temperature was 47.7°, or 3.4° above normal; the highest was 81°, at Cumberland, Md., on the 3d, and the lowest, 4°, at Deerpark, Md., on the 16th. The average precipitation was 2.97, or 0.28 below normal; the greatest monthly amount, 6.52, occurred at Sunnyside, Md., and the least, 1.08, at St. Charles College, Md.—*Oliver L. Fassig.*

Michigan.—The mean temperature was 35.1°, or about normal; the highest was 76°, at Berrien Springs, Plymouth, and Stanton on the 1st, and at Ludington on the 5th, and the lowest, 8° below zero, at Humboldt on the 26th. The average precipitation was 3.63, or 1.06 above normal; the greatest monthly amount, 7.67, occurred at Berrien Springs, and the least, 0.20, at Humboldt.—*C. F. Schneider.*

Minnesota.—The mean temperature was 25.4°, or 1.5° below normal; the highest was 72°, at Milan on the 3d, and the lowest, 26° below zero, at Hallock on the 23d. The average precipitation was 0.62 or about 0.40 below normal; the greatest monthly amount, 1.77, occurred at Caledonia, and the least, 0.20, at Blooming Prairie.—*T. S. Outram.*

Mississippi.—The mean temperature was 56.7°, or 1.5° above normal; the highest was 90°, at Columbus on the 23d, and the lowest, 21°, at Jackson on the 26th. The average precipitation was 2.97, or 0.41 below normal; the greatest monthly amount, 8.15, occurred at Natchez, and the least, 0.71, at Bay St. Louis.—*W. S. Belden.*

Missouri.—The mean temperature was 43.5°, or 1.1° above normal; the highest was 84°, at Cook Station on the 22d, and the lowest, 7°, at Maryville on the 21st. The average precipitation was 2.62, or 0.24 above normal; the greatest monthly amount, 8.76, occurred at New Madrid, and the least, 0.20, at Rockport.

Although over most of the central and northern counties there was less precipitation than usual, owing to the heavy rains at the close of October, there was an abundance of moisture for wheat and grasses, except in a few of the eastern counties, where the ground became quite dry during the forepart of the month. The mild temperature was favorable for good growth, and the wheat crop continued in excellent condition, except that in some of the central and southern counties early sown wheat was injured by fly.—*A. E. Hackett.*

Nebraska.—The mean temperature was 35.5°, or 0.8° above normal; the highest was 83°, at Gothenburg on the 5th, and the lowest, 9° below zero, at Ansley and Fort Robinson on the 20th. The average precipitation was 0.15, or 0.53 below normal; the greatest monthly

amount, 0.97, occurred at Minden, while none fell at Madrid and Smithfield.

The dry weather, combined with uniformly moderate temperature, has been favorable for all agricultural interests. All fall sown grain has made good growth, and at the end of the month was in excellent condition.—*G. A. Loveland.*

Nevada.—The mean temperature was 41.0°, or 3.1° above normal; the highest was 78°, at Hawthorne on the 3d and at Candelaria on the 4th, 12th, and 13th, and the lowest, 1°, at Owyhee on the 22d. The average precipitation was 1.34, or 0.77 above normal; the greatest monthly amount, 6.68, occurred at Lewers Ranch, and the least, trace, at Hot Springs.—*J. H. Smith.*

New England.—The mean temperature was 40.0°, or 2.9° above normal; the highest was 74°, at Middletown, Conn., and at Chestnut Hill and Middleboro, Mass., on the 2d, and the lowest, 1° below zero, at Berlin Mills, N. H., on the 28th. The average precipitation was 5.49, or 1.57 above normal; the greatest monthly amount, 10.12, occurred at Vernon, Vt., and the least, 2.96, at South Portsmouth, R. I.—*J. W. Smith.*

New Jersey.—The mean temperature was 47.5°, or 4.0° above normal; the highest was 79°, at Flemington on the 2d and at Salem on 20th, and the lowest, 15°, at Layton and Toms River on the 17th. The average precipitation was 3.43, or 0.56 below normal; the greatest monthly amount, 5.54, occurred at Rivervale, and the least, 1.82, at Cape May C. H.—*E. W. McGann.*

New Mexico.—The mean temperature was 45.6°, or 2.7° above normal; the highest was 80°, at Albert, Fort Union, and Fort Wingate on the 4th and at Mesilla Park on the 8th, and the lowest, 6°, at Springer on the 25th. The average precipitation was 0.45, or 0.20 below normal; the greatest monthly amount, 1.40, occurred at Lyons Ranch, while none was recorded at Albert, Engle, and Raton, and only a trace at Lower Penasco and Springer.—*R. M. Hardinge.*

New York.—The mean temperature was 39.8°, or 2.4° above normal; the highest was 77°, at Walton on the 21st, and the lowest, 2° below zero, at Canton and Watertown on the 16th. The average precipitation was 5.39, or 2.13 above normal; the greatest monthly amount, 8.97, occurred at Number Four, and the least, 2.00, at Lockport.

The weather was generally favorable for winter grain. Wheat and rye made a fine start and were in good condition at the close of the month. Pastures continue green, affording much feed for stock.—*R. G. Allen.*

North Carolina.—The mean temperature was 52.6°, or 3.9° above normal; the highest was 86°, at Sloan on the 1st, and the lowest, 13°, at Highlands on the 9th. The average precipitation was 4.17, or 0.91 above normal; the greatest monthly amount, 8.95, occurred at Kittyhawk, and the least, 2.10, at Salisbury.

A large acreage was seeded to winter wheat, as well as to oats and rye; the seed sprouted nicely and the plants obtained a good start.—*C. F. von Herrmann.*

North Dakota.—The mean temperature was 20.4°, or 2.0° below normal; the highest was 64°, at Power on the 3d and at Fort Yates on the 4th, and the lowest, 29° below zero, at McKinney on the 22d. The average precipitation was 0.32, or 0.38 below normal; the greatest monthly amount, 1.05, occurred at Glenullin, and the least, 0.17, at Steele.—*B. H. Bronson.*

Ohio.—The mean temperature was 41.6°, or 1.0° above normal; the highest was 80°, at Findlay and Greene on the 1st, and the lowest, zero, at Millport on the 16th. The average precipitation was 3.63, or 0.86 above normal; the greatest monthly amount, 7.28, occurred at Thurman, and the least, 2.36, at Philo.

Wheat suffered some from lack of moisture during the first half of the month, but showed decided improvement during the last decade, when there was abundant precipitation with moderate temperature. Early sown wheat, which is only a small percentage of the whole, has been injured by the hessian fly. The late sown germinated slowly and made slow growth during the early part of the month, and consequently is small for the season, but is a good stand, healthy and of good color. The acreage is less than usual. Pastures were improved by the rains, and stock is in good condition generally.—*J. Warren Smith.*

Oklahoma and Indian Territories.—The mean temperature was 50.0°, or 1.6° above normal; the highest was 85°, at Claremore on the 22d, and the lowest, 14°, at Kenton on the 25th. The average precipitation was 1.18, or 0.46 below normal; the greatest monthly amount, 4.10, occurred at Webbers Falls, while none fell at Beaver and Texmo.

The weather was especially favorable for wheat and rye in the ground, and at the close of the month wheat was becoming rank, with some jointing reported. Cattle were being pastured on the wheat and were in fine condition. Cotton picking was in progress throughout the month and much remained to be gathered.—*C. M. Strong.*

Oregon.—The mean temperature was 44.7°, or 0.4° above normal; the highest was 79°, at Toledo on the 12th, and the lowest, 11° below zero, at Dayville on the 21st. The average precipitation was 4.49, or 2.02 below normal; the greatest monthly amount, 12.37, occurred at Falls City, and the least, 0.25, at Prineville.—*E. A. Beals.*

Pennsylvania.—The mean temperature was 43.5°, or 3.2° above normal; the highest was 79°, at Williamsport on the 21st, and the lowest, 7°, at Butler on the 16th. The average precipitation was 4.10, or slightly above normal; the greatest monthly amount, 6.92, occurred at Uniontown, and the least, 1.67, at Browers Lock.—*L. M. Dey.*

South Carolina.—The mean temperature was 55.6°, or 1.6° above normal; the highest was 92°, at Trial on the 25th, and the lowest, 22°, at Holland on the 9th. The average precipitation was 3.32, or 0.50 above normal; the greatest monthly amount, 5.45, occurred at Spartanburg, and the least, 1.50, at Georgetown.—*J. W. Bauer.*

South Dakota.—The mean temperature was 28.7°, or about 1.0° below normal; the highest was 77°, at Vermillion on the 2d, and the lowest, 12° below zero, at Hotch City on the 21st. The average precipitation was 0.26, or 0.33 below normal; the greatest monthly amount, 0.80, occurred at DeSmet, and the least, trace, at Alexandria, Fort Randall, Mellette, and Plankinton.—*S. W. Glenn.*

Tennessee.—The mean temperature was 49.3°, or 1.1° above normal; the highest was 82°, at Savannah on the 20th, and the lowest, 13°, at Rugby on the 30th. The average precipitation was 6.24, or 2.18 above normal; the greatest monthly amount, 10.74, occurred at Oakhill, and the least, 3.18, at Ashwood.

Warm, dry weather the first half of the month favored the ravages of the hessian fly and many fields of early sown wheat were ruined. Late sown wheat was generally looking well at the close of the month.—*H. C. Bate.*

Texas.—The mean temperature was 59.1°, or 2.4° above normal; the highest was 96°, at Fort McIntosh on the 19th, and the lowest, 22°, at Lampassas on the 12th. The average precipitation was 1.79, or 0.38 below normal; the greatest monthly amount, 8.43, occurred at Trinity, and the least, trace, at Sanderson.

The month, as a whole, was favorable for agricultural interests. Where cotton picking was not completed the work was carried forward under the most favorable conditions, and was generally completed by the middle of the month. The yield of cotton was generally better than anticipated a few months ago, except over the lower Brazos Bottoms, where the crop was almost an entire failure. Wheat sowing made good progress and the weather was exceptionally favorable for this work prior to the 17th. The rains which followed over the wheat belt were not heavy enough to materially retard work, but were very favorable for the germination and growth of the crop. Altogether the wheat outlook is very favorable. Sugar cane matured favorably and is being manufactured as rapidly as practicable. Fall truck gardening has progressed nicely.—*I. M. Cline.*

Utah.—The mean temperature was 40.1°, or 3.2° above normal; the highest was 80°, at St. George on the 3d, and the lowest, 1°, at Loa on the 27th, 28th, and 30th. The average precipitation was 1.51, or 0.76 above normal; the greatest monthly amount, 5.07, occurred at Huntsville, and the least, trace, at Cisco.—*L. H. Murdoch.*

Virginia.—The mean temperature was 49.9°, or 4.1° above normal; the highest was 83°, at Petersburg on the 23d, and the lowest, 12°, at Meadowdale on the 16th. The average precipitation was 3.50, or 0.75 above normal; the greatest monthly amount, 7.03, occurred at Bigstone Gap, and the least, 1.12, at Columbia.

The weather during the month was quite favorable; the sunshine was ample and the soil warm. This brought about an excellent growth of the early sown wheat and promoted the rapid germination of the later seedings, so that at the close of the month the crop was in a very promising condition. Where the crop has come up it is green and vigorous, and a generally good stand has been secured.—*E. A. Evans.*

Washington.—The mean temperature was 38.5°, or 1.7° below normal; the highest was 69°, at Southbend on the 12th, and the lowest, 16° below zero, at Ellensburg on the 21st. The average precipitation was 3.52, or 2.54 below normal; the greatest monthly amount, 13.32, occurred at Clearwater, and the least, 0.64, at Mottingers.

The cold of the 18th to 22d was general over the State and was one of the earliest and most severe on record for November.—*G. N. Salisbury.*

West Virginia.—The mean temperature was 45.5°, or 1.9° above normal; the highest was 86°, at Spencer on the 20th, and the lowest, 9°, at Central Station and Philippi on the 16th. The average precipitation was 5.20, or 1.45 above normal; the greatest monthly amount, 8.88, occurred at Princeton, and the least, 2.71, at Magnolia.

The good rains and mild weather that occurred during the latter part of the month gave wheat a good start, and it is now reported to be looking fairly well, with a normal acreage sown, although in some southern sections complaint is made of damage by the fly and grubworm.—*E. C. Vose.*

Wisconsin.—The mean temperature was 30.5°, or 1.9° below normal; the highest was 70°, at Prairie du Chien on the 4th, and the lowest, 7° below zero, at Osceola on the 23d. The average precipitation was 1.59, or slightly below normal; the greatest monthly amount, 4.19, occurred at Racine, and the least, 0.21, at Casco.—*W. M. Wilson.*

Wyoming.—The mean temperature was 33.6°, or 1.6° above normal; the highest was 74°, at Wheatland on the 5th, and the lowest, 15° below zero, at Parkman on the 20th. The average precipitation was 0.39, or 0.27 below normal; the greatest monthly amount, 2.53, occurred at Evanston, while none fell at Lusk and Thermopolis.—*W. S. Palmer.*

SPECIAL CONTRIBUTIONS.

MONTHLY STATEMENT OF AVERAGE WEATHER CONDITIONS FOR NOVEMBER.

By Prof. E. B. GARRIOTT.

The following statements are based on average weather conditions for November, as determined by long series of observations. As the weather of any given November does not conform strictly to the average conditions the statements can not be considered as forecasts:

In its general character November weather forms a mean between the heat of late summer and early fall and the cold of winter, and, in marked contrast to the severe storms of August, September, and October, the weather in the tropical and subtropical regions of the Atlantic Ocean is usually settled and fine. In the Pacific Ocean and on the southeastern coasts of Asia the typhoon season is nearing its end. In the middle latitudes of the oceans the winds become stronger and blow more steadily from the northwest, shifting to west, southwest, and south, as a given parallel is followed from their western to their eastern shores. The storms encountered in the middle latitudes are not as strong as the tropical bred storms of the preceding month, nor the storms which occur during the winter season. The southward flow of arctic ice in the Atlantic has ceased, and but little fog is encountered in the transatlantic steamship routes near Newfoundland.

In the United States the Pacific coast wet season begins in October, and the rainfall increases until December. Over the middle and northern Plateau regions there is an increase in rainfall as compared with the summer and early fall months, except in Utah, where the rainfall is less than in October. In Arizona and New Mexico November is dry as compared with the summer months. In Montana November is one of the driest months of the year. In the great corn and wheat growing districts of the central valleys there is a gradual diminution in rainfall from summer to midwinter. In the east Gulf and South Atlantic States November rainfalls are commonly light, and in the west Gulf districts they fall short of the summer average. From the Lake region and Ohio Valley, over the Middle Atlantic and New England States there is a general, though not well-marked, decrease in rainfall from midsummer to midwinter.

In the interior of the Gulf and South Atlantic States garden truck is subject to damage by frost, and damaging frost is likely to occur in central and northern Florida in November.

RAINFALL FROM CONVECTIONAL CURRENTS.

By H. H. KIMBALL, U. S. Weather Bureau.

A great deal of popular as well as scientific interest attaches to the excessively rapid rates of rainfall that are occasionally experienced in the United States, not only because of their effects, which are often disastrous, but also because they are manifestations of the tremendous amount of latent energy that nature has at her command.

TABLE 1.

Stations.	Rate per hour in inches for –		
	5 minutes.	10 minutes.	60 minutes.
Bismarck, N. Dak	9.00	6.00	2.00
Jacksonville, Fla..	7.44	7.08	2.20
Galveston, Tex	6.48	5.58	2.55

In Weather Bureau Bulletin D, Rainfall of the United States, Prof. Alfred J. Henry gives the foregoing as the maximum rates of rainfall that have been recorded at Weather Bureau stations, and in the MONTHLY WEATHER REVIEW for September, 1898, he has shown that one inch of rainfall is equivalent to 27,154 gallons, or 226,000 pounds of water per acre, the gallon containing 231 cubic inches, and a cubic inch of water weighing 252.286 grains. Rainfall at the rate of 9 inches per hour therefore represents a fall of 33,900 pounds, or 4,073.1 gallons per acre each minute, and in five minutes over an area of 4 square miles represents a fall of 51,000,000 gallons, an amount considerably in excess of the daily water supply and consumption of Washington, D. C.

What is the source whence the vast amount of water indicated by the above rates of precipitation is derived?

In the Smithsonian Report for 1888, page 410, Prof. Cleveland Abbe gives the water equivalent of the aqueous vapor in air for columns of different heights for various surface conditions. His table is here reproduced.

TABLE 2.—*Depths of water in the atmosphere corresponding to various dew-points at the earth's surface.*

Height of column of air.	Dew-point.			
	80°	70°	60°	50°
Feet.	*Inches.*	*Inches.*	*Inches.*	*Inches.*
6,000......	1.3	1.0	0.7	0.5
12,000.....	2.1	1.5	1.1	0 8
18,000......	2.5	1.8	1.3	0.9
24,000......	2.7	2.0	1.4	1.0
30,000......	2.8	2.1	1.5	1.1

It is evident from this table that there may be contained in the air column immediately above us, in the form of invisible vapor, sufficient moisture to produce over 2 inches of rainfall if it could all be precipitated, and if this column could be renewed each hour a rate of rainfall equal to any on record could be maintained.

It is not the purpose of this paper to discuss the various methods by which the vapor of water in the atmosphere may be precipitated, but rather to consider the condensation and precipitation that may result from ascending, or convectional currents.

We will first consider the nature of atmospheric moisture.

As is well known the atmosphere is not a simple gas like hydrogen or oxygen, but consists of a mechanical mixture of gases and vapors, the most important of which are nitrogen, oxygen, and aqueous vapor.

Gases are perfectly elastic, and the amount of gas a given space will contain varies directly with the pressure, and is inversely proportional to the temperature. If we diminish the pressure on a gas and allow it to expand against a lower pressure, work is done at the expense of the temperature of the gas and the gas cools off. Conversely, if the gas is compressed it becomes warmer.

The term vapor applies more properly to a gas near its temperature of condensaton. Near this point the gas ceases to be perfectly elastic, and either the cooling or the compression of the vapor may be carried to such an extreme that the space occupied can contain no more of it. The space is then said to be saturated. If the compression or cooling is continued beyond this point, some of the vapor will be converted into a liquid.

The oxygen and nitrogen of the air can be liquified only under a combination of extremely high pressures and very low temperatures, but the aqueous vapor, if present in any

considerable quantity, may be condensed by comparatively slight cooling under normal pressure.

The following extract from Prof. C. F. Marvin's moisture tables (W. B. No. 171) shows the maximum number of grains of aqueous vapor that may be contained in a cubic foot of space. The quantity is the same whether the vapor occupies the space alone, or in conjunction with various gases.

TABLE 3.—*Maximum weight of aqueous vapor contained in a cubic foot.*

	Temperature, Fahrenheit.									
	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°
Grains of aqueous vapor..........	0.481	0.776	1.235	1.935	2.849	4.076	5.745	7.980	10.934	14.790

A cubic foot of space saturated with aqueous vapor at a temperature of 80° contains 10.934 grains, and if cooled to 70° could contain but 7.980 grains. It follows that 2.954 grains would be condensed into liquid drops, that would either remain suspended as fog, or be precipitated as water. If the cooling continue to 40°, 8.085 grains of moisture would be condensed, leaving only 2.849 grains of the vapor.

We will suppose the temperature in our cubic foot of space to be 90°, and the amount of moisture only 70 per cent of that required for saturation; that is, the *relative humidity* is 70, and the weight of the vapor is 10.353 grains. Should the temperature fall to 40° only 2.849 grains could continue in a state of vapor, the remaining 7.504 grains being condensed.

This weight of the vapor in a unit volume is called the *absolute humidity*.

In nature, any process that will cool the atmosphere below its saturation temperature will cause condensation of moisture. It is generally admitted that the expansion that takes place in ascending currents, is a fruitful source of cooling and consequent condensation of the aqueous vapor of the atmosphere.

The process by which this cooling is accomplished can best be understood by first considering what takes place when a small quantity of heat is imparted to a known mass of air. A portion of the heat is converted into work, and is employed in overcoming the resistance that the pressure of the air exerts against expansion. The remainder is available for raising the temperature of the air mass.

In adiabatic expansion we have expansion without the receipt of heat from any external source, and the energy necessary to do the work of expansion is obtained at the expense of the heat already present in the air. It is therefore evident that the work of expansion must cool the air.

After the air has been cooled to such an extent that it is saturated with aqueous vapor, a small portion of the heat required in the work of further expansion is furnished by the liberation of the latent heat of the water condensed, and the rate of cooling is thereby diminished.

From our knowledge of physics we are enabled to express these adiabatic processes in mathematical language, as has been done by Kelvin, Ferrel, Hertz, Bezold, and others. A convenient arrangement of their results may be found on pages 492–494, equations 71–127, of Part II, Report of the Chief of the Weather Bureau, 1898–99; but the equations are so cumbersome for purposes of computation that but little practical use has been made of them.

In order that these equations may be more easily applied to the adiabatic thermodynamic problems of the atmosphere, Prof. Frank H. Bigelow has developed them in the form given on page 496, equations 144–148, of the above report. Equations 145 and 146, which follow, express the adiabatic processes within expanding and cooling air until it cools down to the freezing temperature.

For air unsaturated with moisture:

Iα.

$$(145)\ldots.\ \left(0.2374+0.1512\,\frac{e}{B}+0.0232\,\frac{e^2}{B^2}\right)\log T$$

IIα.

$$-\left(0.06858+0.02592\,\frac{e}{B}\right)\log B=C\alpha.$$

For air saturated with moisture:

Iβ.

$$(146)\ldots.\ \left(0.2374+0.4743\,\frac{e}{B}+0.145\,\frac{e^2}{B^2}\right)\log T$$

IIβ.

$$-\left(0.06858-0.04266\,\frac{e}{B}\right)\log\,(B-e').$$

IIIβ.

$$+\left[\frac{497.5}{T}-0.4404-\left(\frac{309.4}{T}-0.2739\right)\frac{e}{B}\right]\left(\frac{e'}{B-e'}\right)=C\beta.$$

The equations for temperatures below freezing are not here considered, since the general absence of hail during periods of excessive precipitation indicates that it is only in exceptional cases that convectional currents extend to a sufficient height to reach freezing temperatures.

In the equations above given we have to do with the following quantities:

T = absolute temperature = $t+273$, in degrees centigrade.

B = barometric pressure, in millimeters.

e = pressure of the aqueous vapor, in millimeters.

e' = pressure of the aqueous vapor, in millimeters, in the saturated stage.

$C\alpha$ = the numerical value of the equation for the unsaturated stage, which *is a constant for any given value of* $\frac{e}{B}$.

$C\beta$ = the numerical value of the equation for the saturated stage, which is *also a constant for any given value of* $\frac{e}{B}$.

The logarithms are Naperian logarithms.

The unit is 1,000 grams.

If we observe B, t, and e at the surface of the earth and determine the constant $C\alpha$, equation 145 can then be solved for any desired value of B, and the corresponding t determined, or vice versa. Equation 146 can then be solved, as will be shown later.

In tables 94 to 99, inclusive, pp. 550–556 of the report above quoted, the values of the quantities in these equations are tabulated in such form as to render the computation for the four following cases quite simple:

(1) At Washington, D. C., on June 29, 1895, 0.93 inch of rain fell between 7:05 p. m. and 9:10 p. m., 0.80 inch falling during the first fifteen minutes. (2) On August 13, 1896, 1.73 inches fell between 5:20 p. m. and 8:24 p. m., 1.57 inches falling in forty-five minutes. On both these dates 0.42 inch fell in five minutes, which is at the rate of 5.04 inches per hour. (3) On August 12, 1898, 4.96 inches of rain fell between 9:20 a. m. and 11 p. m. (4) On June 2, 1900, 3.48 inches fell between 2:15 p. m. and 6:30 p. m.

If we introduce into equation 145 the values of B, t, and e, observed at Washington on these four dates, we shall be able to compute the respective temperatures and pressures at which the air in ascending currents would become saturated, and clouds would commence to form. With the B and t thus determined, which we will designate B_s and t_s, we may now

compute from equation 146 the respective pressures at which freezing temperature would be reached.

Having determined t and B, we may compute the corresponding altitude by the aid of the hypsometric formulæ which Professor Bigelow has evaluated in tables 91 to 93 of the Report of Chief of Weather Bureau, 1898–1899. The resulting heights are given in the accompanying Table 4, where the altitude corresponding to the saturation temperature is designated by h_s, and that corresponding to the freezing temperature is designated by h'_o.

The equation $\mu = 622\frac{e}{B} + 235\frac{e^2}{B^2}$ = grains of aqueous vapor in a kilogram of saturated air, will enable us to determine at any point what percentage of the aqueous vapor originally present has been condensed, and, in conjunction with the *absolute humidity* at t_s, will also enable us to compute the number of cubic feet of air that must be cooled from t_s to any desired temperature, as the freezing point, in order that the equivalent of one inch of rainfall may be condensed.

Finally, by dividing this last result by 5280, we shall obtain, in miles per hour, the velocity of an ascending current that will condense the equivalent of one inch of rainfall per hour.

Tables 10 and 157 of the Report of the Chief of the Weather Bureau, already quoted, will enable us to check our results. Table 10 gives the mean heights of the bases and tops of cumulus and cumulo-nimbus clouds, as determined from theodolite measurements at Washington, and Table 157 gives the fall in temperature from the surface to different heights, as determined from all available balloon observations.

The diagram of our several results is very instructive. (See fig. 1.) We notice at once that the 8 a. m. conditions give us t_s at a much lower altitude than the 2 p. m. conditions, and that in general the higher the surface temperature the greater the height at which the saturation temperature will be reached.

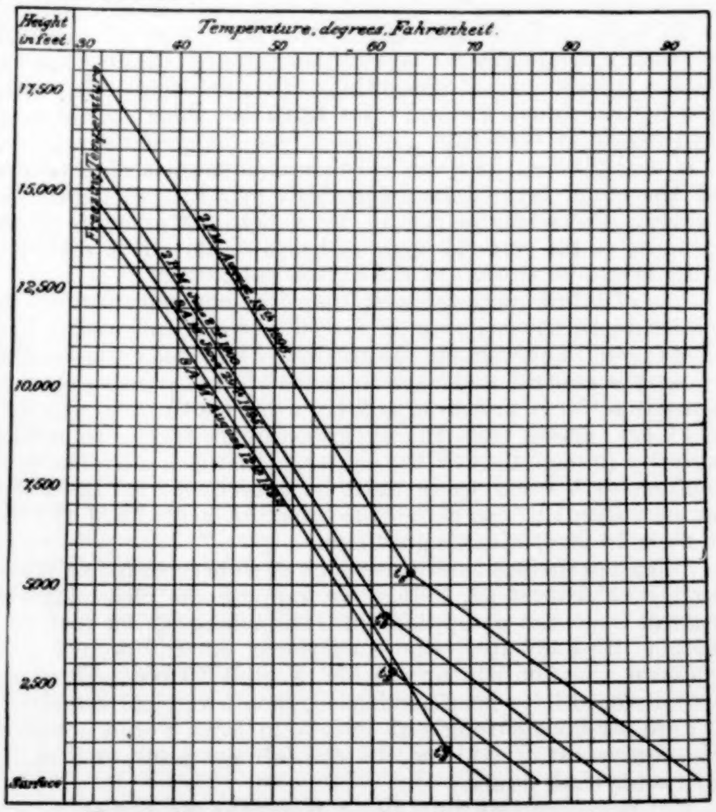

FIG 1—Diagram showing adiabatic rates of cooling.
(The dates June 29, 1895, and August 12, 1898, should be transposed).

66——2

This is as we find it in nature, since the morning clouds form lower than the midday clouds, the height advancing with the temperature. But since the diurnal range of temperature is much greater at the surface than at the cloud level, the diurnal variation in the cloud heights is not nearly so marked as is indicated by the results of the computation.

It has been found, from the study of temperatures obtained by kite and balloon observations, that the actual vertical temperature gradient averages much less than the adiabatic rate of cooling, but approaches to it, and even passes it on warm summer afternoons. As soon as the air near the surface becomes heated to such an extent that the vertical temperature gradient exceeds the adiabatic rate of cooling, convectional currents will be set in motion. If sufficient moisture is present the ascending current will become saturated, a cumulus cloud will form, and the rate of cooling will be much retarded, as indicated by the change in the inclination of the lines on the diagram (fig. 1) at t_s. The velocity of the ascending current and the thickness of the cloud will depend not alone upon the overheating of the air near the surface, but also upon the amount of vapor present.

The following is the computation of our four cases by equations 145 and 146:

TABLE 4.—*Adiabatic changes, computed from Bigelow's equations 145 and 146, and tables 94–99 for four cases at Washington, D. C.*

		June 29, 1895.		August 13, 1896		August 12, 1898.		June 2, 1900.	
		8 a. m.		2 p. m.		8 a. m.		2 p. m.	
		Units of measure.							
		English.	Metric.	English	Metric.	English.	Metric.	English.	Metric.
Surface conditions.	B	30.16	766.1	30.01	762.8	30.05	763.3	29.91	759.7
	t	77.0	25.0	93.0	33.9	72.0	22.2	84.0	28.9
	e	0.616	15.65	0.707	17.96	0.707	17.96	0.629	15.98
	$\frac{e}{B}$	.0204	.0204	.0236	.0236	.0235	.0235	.0210	.0210
Ca, from equation 145 using surface B, t, and e.	Ia	......	+1.3703	......	+1.3800	......	+1.3707	......	+1.3739
	IIa	......	−.4589	......	−.4592	......	−.4592	......	−.4585
	Ca	......	.9114	......	.9208	......	.9115	......	.9154
Saturated conditions from equation 145.	ts	62.15	16.75	63.7	17.6	68.2	20.1	61.3	16.3
	e'	......	14.18	......	14.95	......	17.47	......	13.77
	Ia	......	1.3636	......	1.3672	......	1.3690	......	1.3637
	Ca	......	.9114	......	.9208	......	.9115	......	.9154
	IIa	......	−.4522	......	−.4464	......	−.4575	......	−.4483
	Bs	......	694	......	634	......	744	......	655
	ht.=hs	2,815	858	5,298	1,615	732	223	4,245	1,294
	$\frac{e'}{B}$	......	.0204	......	.0236	......	.0235	......	.0210
	$\frac{e}{B-e'}$	......	.0209	......	.0242	......	.0241	......	.0215
	μ	......	12.75	......	14.81	......	14.75	......	13.17
	abs. hum.	5.972	......	6.499	......	7.336	......	6.001	......
$C\beta$ from equation 146 and Bs and ts.	$I\beta$	......	+1.4010	......	+1.4105	......	+1.4123	......	+1.4023
	$II\beta$	......	−.4416	......	−.4343	......	−.4453	......	−.4374
	$III\beta$	......	+.0263	......	+.0303	......	+.0298	......	+.0271
	$C\beta$	......	.9857	......	1.0065	......	.9968	......	.9920
Beginning of freezing conditions from equation 146.	t	32.0°	0.0°	32.0°	0.0°	32.0°	0.0°	32.0°	0.0°
	e'	......	4.57	......	4.57	......	4.57	......	4.57
	$I\beta$	......	1.3863	......	1.3949	......	1.3946	......	1.3879
	$C\beta$	......	.9857	......	1.0065	......	.9968	......	.9920
	$II\beta+III\beta$	......	−.4006	......	−.3884	......	−.3978	......	−.3959
	$B-e'$	......	454.0	......	395.5	......	443.5	......	429.5
	$\frac{e'}{B-e'}$	......	.0101	......	.01155	......	.0103	......	.0106
	$II\beta$	......	−.4143	......	−.4041	......	−.4118	......	−.4103
	$III\beta$	......	+.0137	......	+.0157	......	+.0140	......	+.0144
	$II\beta+III\beta$	......	−.4006	......	−.3884	......	−.3978	......	−.3959
	B	......	458.6	......	400.0	......	.448	......	434
	h'_o	14,108	4,300	17,870	5,447	14,639	4,462	15,617	4,760
	h'_o-hs	11,293	3,442	12,572	3,832	13,907	4,239	11,372	3,466
	μ'	......	6.24	......	7.12	......	6.37	......	6.56

TABLE 4—*Continued.*

Heights at which other temperatures would be reached.

	June 29, 1895.		August 13, 1896.		August 12, 1898.		June 2, 1900.	
	8 a. m.		2 p. m.		8 a. m.		2 p. m.	
	Units of measure.							
	English.	Metric.	English.	Metric.	English.	Metric.	English.	Metric.
t'	53.6	12.0	53.6	12.0	59.0	15.0	53.6	12.0
h'	6,227	1,898	9,570	2,917	4,492	1,369	7,520	2,292
t'	46.4	8.0	46.4	8.0	50.0	10.0	46.4	8.0
h'	8,996	2,742	12,498	3,808	8,114	2,473	10,328	3,148
t'	39.2	4.0	39.2	4.0	41.0	5.0	39.2	4.0
h'	11,545	3,519	15,160	4,621	11,474	3,497	12,959	3,950

TABLE 5.

Heights at which freezing temperature would be reached $= h$, as computed from Bigelow's Table 157.

h_b	14,764	4,500	17,716	5,400	18,701	5,700	12,189	3,700
$h_b - h'_o$	656	200	—154	—47	4,062	1,238	—3,478	—1,060

TABLE 6.—*Summary.*

	June 29, 1895.	August 13, 1896.	August 12, 1898.	June 2, 1900.
	8 a. m.	2 p. m.	8 a. m.	2 p. m.
(1) Percentage of vapor condensed between t_s and $t = 32°$ F., $= 100\% - \frac{\mu'}{\mu}$	51%	52%	57%	50%
(2) Grains of vapor condensed in each cubic foot of air cooled from t_s to 32° F., = absolute humidity at $t_s \times$ (1)	3.046	3.380	4.182	3.001
(3) Number of cubic feet of air that must rise from h_s to h'_o to condense the equivalent of one inch of rainfall = (252.286 × 144 = 36,329) ÷ (2)	11,927	10,748	8,687	12,106
(4) Velocity of ascending current at height h_s, in miles per hour, that would condense the equivalent of one inch of rainfall per hour = (3) ÷ 5280	2.26	2.04	1.65	2.29
(5) Velocity of ascending current at height h_s, in miles per hour, that would condense the equivalent of 5 inches of rainfall per hour = (4) × 5.	11.30	10.20	8.25	11.45

Mean height of base of cumulus clouds (Table 10)	1,182 meters.
Mean height of base of cumulo-nimbus clouds (Table 10)	1,750 meters.
Mean height of base of clouds computed from p. m. data, cases 2 and 4	1,455 meters.
Mean height of top of cumulo-nimbus clouds (Table 10)	4,965 meters.
Mean height of freezing temperature (Table 157)	4,825 meters.
Mean height of freezing temperature computed from p. m. data, cases 2 and 4	5,104 meters.

The values of h_b have been computed from the data in Table 157 which applies to high areas and clear weather. As a matter of fact, while the barometer was high on August 12, 1898, the entire day was cloudy, although only a few miles away the sky was only partly obscured, and little or no rain fell; on June 2, 1900, while the sun was shining until shortly before the rain began, the barometer was below the normal. We can not, therefore, consider the values of h_b to be very exact.

The comparison in Table 6 of the mean of our p. m. computed results with the determinations by both theodolite and balloon observations, indicates nothing in the results discordant with the conditions as they actually exist. It seems quite probable that convectional currents would have been maintained on these afternoons until a temperature of 32° F. was nearly or quite reached. In fact, a few hailstones fell on June 2, 1900.

The maximum temperature on June 29, 1895, was 87° F. Had this value of t been substituted in equation 145 instead of the 8 a. m t, our results would have shown that the conditions favored strong convectional currents on that day also. On the dates June 29, 1895, August 13, 1896, and June 2, 1900. the rain fell during a thunderstorm.

The rainfall of August 12, 1898, appears to have been of a different character. The maximum temperature of the day was 76° F., and local surface conditions, except the high humidity, did not favor convectional currents, although favorable conditions may have existed at the cloud level. No electrical display accompanied this storm.

The results indicate that it is not unreasonable to attribute the rapid rates of rainfall experienced during thunderstorms to condensation by adiabatic cooling of ascending air. An ascending current of 10 or 12 miles per hour would account for the most rapid rate that occurred during any one of these storms. Indeed, it is not necessary to assume so high a velocity as this; for no doubt the vertical movement, like the horizontal, is quite irregular; and since it is capable of sustaining a quantity of condensed vapor, which, if the water drops are large, may vary approximately as the square of its velocity, it follows that during the periods of relatively slow upward movement the accumulation of raindrops would be allowed to fall, and the rate of precipitation would thereby be made to greatly exceed the rate of condensation. The size of the raindrops is probably an indication of the velocity of the ascending current in which they were formed and supported.

It must not be supposed that all the moisture condensed by adiabatic cooling falls to the earth as rain. In fact, the equations 145 and 146 are based on the supposition that all the moisture is retained. The dense cumulus clouds so frequently observed indicate that a very considerable amount of condensation frequently occurs without any precipitation. But if the convectional currents are at all active and the dew-point is high, as was the case on the days we have considered, there comes a time when the cloud space can retain no more moisture and any further condensation will result in rainfall.

In Bulletin No. I, 1899, of the Blue Hill Meteorological Observatory, Mr. H. Helm Clayton has computed that the precipitation from a current ascending with a velocity of 3.6 miles per hour, through a cloud layer 1,640 feet thick should occur at the rate of 0.12 inch per hour, the mean temperature of the cloud being 34.8° F. The temperature and thickness of the cloud layer were determined by a kite meteorograph record. It is interesting to note that his estimate of the velocity of the vertical current, based on its effect upon the kite, is one-tenth that of the horizontal current.

The effect of mountains in causing condensation of the moisture in the air that is forced upward in passing over them is well understood. In the well-developed cyclones that cross the central and eastern parts of this country there is usually a warm, moist current from the south in front, and a cold, dry current from the northwest in the rear, both moving spirally inward toward the center. As these currents push against each other there must be a tendency for the warm, moist current to rise above the other on account of the difference in their specific gravities.

With the surface conditions such as were recorded at Washington on August 12, 1898, if we suppose the cloud layer to extend from the computed saturation height, 732 feet, to a height of 4,492 feet, where adiabatic cooling would have reduced the temperature to 59° F., and 20 per cent of the vapor would have been condensed, then a vertical velocity of 1 mile per hour throughout the cloud layer would condense the equivalent of 0.21 inch of rainfall per hour, or 5 inches in twenty-four hours.

But here again we must not commit the error of supposing that all the moisture condensed as cloud will fall as rain. Mr.

Clayton found on the day that the kite observations were made, on which he based his calculation, that the observed rate of precipitation was only one-tenth of the computed rate. He concluded that much of the condensed moisture was reabsorbed by the unsaturated lower layers of the atmosphere.

While this might be true with a saturation temperature of 34.8° F., such as he observed, since the total amount of vapor present in the air would necessarily be small, as shown by Table 3, we can not suppose that any such proportion of the moisture condensed under conditions such as we have here considered would be so reabsorbed.

Undoubtedly there are many considerations that will contribute to reduce the precipitation to a rate much below that of condensation. Nevertheless, Professor Bigelow's tables for computing the adiabatic changes under various surface conditions have opened up to us a profitable field for study.

RAINFALL ON THE ISLAND OF ST. KITTS, W. I.

By W. H. Alexander, Observer, Weather Bureau, dated Nov. 19, 1900.

This paper is the fulfilment of a purpose expressed in an article on the Climatology of St. Kitts, published in the Review, Annual Summary, for 1899, and for obvious reasons the two should be considered together, the one being supplementary to the other.

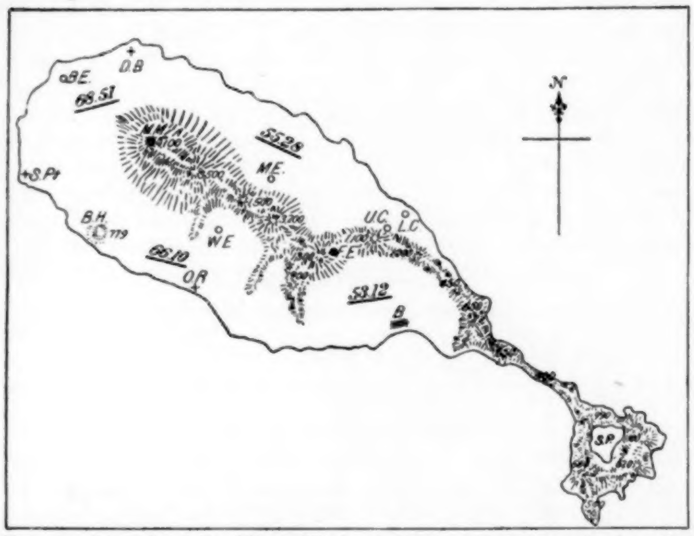

Fig. 2.—Island of St. Kitts, W. I., latitude 17° 18′ north, longitude 62° 48′ west.

Explanatory.

B. Basseterre, the capital and chief town; location of U. S. Weather Bureau. O. R. Old Roads, a small village. B. H. Brimstone Hill, at one time a celebrated fortress. S. Pt. Sandy Point, a small village. D. B. Dieppe Bay, a small village. M. M. Mount Misery, an extinct volcano, about 4,100 feet high. S. P. Salt Pond. W. E. Wingfield Estate. M. E. Molyneux Estate. L. C. Lower Canada. U. C. Upper Canada. F. E. Fountain Estate. B. E. Brotherson Estate.

Attention is first invited to the careful consideration of the accompanying map of St. Kitts, which together with the descriptive matter found in the article in the Annual Summary, ought to give the reader a very clear idea of the contour and physical features of the island. Very great pains have been taken in the construction of this map, and it is believed to be entirely trustworthy for all purposes, being simply a reduced form of a map issued by the Admiralty of the English Government. Only such places as are referred to elsewhere in the text, and those of peculiar interest, have been noted on the map, the main purpose being to render more intelligible the divisions made of the island for this discussion. The guiding principle in the division was to group those estates similarly situated with reference to the hills and mountains, and so, if possible, arrive at some estimate of the local influences which obtain on the island with regard to rainfall. We make four divisions as follows, viz:

1. *The north end.*—This includes all that portion of the island to the north of a line drawn, say, from Sandy Point (S. Pt.) in a nearly northeasterly direction, crossing the foot hills of the mountains and then to the sea. Roughly speaking, this embraces about twenty-eight per cent of the cultivated portion of the island. The rainfall in this district is, perhaps, the least influenced by the elevated portions of the island, or if at all, certainly very differently affected thereby. The average annual rainfall on this area, as determined by the records of the thirteen stations covering a number of years, is 68.51 inches, as indicated on the map, and also in Table 1. The greatest annual rainfall on record, 114.68 inches, occurred at Brotherson's estate, within this division, in 1898.

2. *The east side.*—This division embraces all the estates on the windward side of the island, and represents about twenty-seven per cent of all the cultivated portion of the island. The influence of the mountains upon the rainfall of this district is attested by a marked decrease of more than 13 inches in the yearly average from that of the north end, being only 55.28 inches. This decrease may be partly accounted for by a phenomenon frequently noticed, especially on days when strong convectional currents are present—the passing of the clouds around instead of over the mountains. For instance, a large cumulo-nimbus cloud may be seen approaching from the east, but as it nears the land it will be seen to change its course and pass either around the mountains or perhaps will be drawn over the depression in the mountain range of the main body of the island. As a result, we find a very heavy rainfall on both sides of this depression, as shown by the records of the two estates, Molyneux and Wingfield, given in the table. The clouds sometimes divide, one portion going north or south of the mountains, and the other over the depression just mentioned.

3. *The south end.*—This division includes the picturesque and fertile Valley of Basseterre, and is encircled on three sides by hills and mountains of heights varying from 400 to 1,300 feet, as shown on the map; it contains about twenty-nine per cent of the cultivated land of the island, and has the smallest average rainfall of the four districts, it being only 53.12 inches, or more than two inches below the east side and 15 inches below the north end.

4. *The west side.*—This division contains only about 16 per cent of the cultivated lands of the island and is situated on the leeward side of the great mountain range, which runs ridge-pole like through the central part of the main body of the island. The average for this district—66.10 inches—is not far below that of the north end. Perhaps the most interesting point in this district as regards our present discussion is that of the Wingfield estate mentioned above.

Taking the island as a whole the records seem to indicate an annual average of 59.25 inches, which is an appreciable increase upon the average given in the discussion in the Annual Summary for 1899, namely, 51.66 inches; which, however, was the average for Basseterre alone. The greatest downpour at any one time was that known as the flood of 1880, an account of which may be found on page 196 of the Review for January, 1899. In addition to what has been said I will add a note found in Mr. Evelyn's old records made at the time of the flood. It reads:

> Supposed that 36 inches fell during the time from 12 o'clock (noon) to 3 a. m. of 12th. Town flooded; immense damage to houses; 230 lives lost and missing.

The month of March, 1891, is the driest month on record. The average for the island was only 0.16 inch, whereas the normal amount for that month is about 1.57 inches. Attention is called to the fact that there is a difference of only 0.08 inch in the annual mean at Molyneux and Wingfield estates.

The former is on the windward side of the mountains about 700 feet above the sea and the latter is on the leeward side about 175 feet above the sea. Then again the records of Upper and Lower Canada are worthy of note. Here we have two estates similarly situated, except that one is about 400 feet higher than the other. As a result of this difference in elevation we see a marked and very uniform difference in the monthly and yearly means. See Table 2.

In the year 1899 the prevailing wind for each month in the year was from the east except for December, which was northeast. Or, to state it in another way, the wind was from the east during 54 per cent of the time and from the northeast during 32 per cent of the time. The prevailing winds, together with such other facts as may be gained from this and preceding papers on this subject, prepare the reader for an intelligent appreciation of the agencies which operate in producing and modifying the rainfall on the Island of St. Kitts.

The gages used at these stations were imported from England and appear to be well and scientifically constructed, there being a fixed and uniform ratio between the diameter of the funnel and the diameter of the graduated tube. The measurements are made with great care and regularity, the day, as a rule, is counted from 6 a. m. to 6 a. m., local time.

It only remains to be said with reference to Table 4 that it is the result of an effort to secure some mountain observations and is almost self explanatory. Fountain estate is about 850 feet above sea level and the only available place for such work. The owner, Miss Marshall, kindly consented to do the work if provided with instruments. Accordingly she was equipped with maximum, minimum, and dry thermometers, and these were duly installed on February 14, 1900, and the first observations were made on the following day. The observations were taken on seventy-fifth meridian time and were continued up to and including May 17, 1900. Only two observations were missed during the time. Unfortunately the maximum thermometer was broken at the end of the first week, so that no note is made of the readings of the maximum thermometer except for the one week. The corresponding data on record at this office for precisely the same time are also inserted in the table for the sake of comparison.

The data in Table 5 are fully explained in the foot note, and it only remains to say that the work was done at my request and by responsible parties.

TABLE 1.—*Monthly and yearly means of rainfall within each of the four divisions into which the island is divided.*

Divisions.	No. stations	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	For year.
North end	13	3.35	2.42	1.92	3.63	8.16	4.39	6.41	7.22	8.47	7.39	7.87	5.57	68.51
East side........	15	3.00	1.96	1.33	3.12	6.45	3.40	5.01	6.98	7.46	7.31	6.94	4.49	55.28
South end.....	11	2.95	2.27	1.12	2.08	5.53	3.08	4.59	6.26	6.96	4.82	4.92	4.99	53.12
West side......	7	4.18	2.53	1.91	2.30	4.41	3.64	6.07	7.37	6.84	6.66	6.45	5.50	66.10

NOTE.—The first column shows the number of stations upon whose records the means are based.

TABLE 2.—*Monthly and annual means for certain estates which for local causes present interesting points.*

Estates.	No. years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	For year.
Brotherson's...	5	4.33	2.69	2.58	4.28	7.42	7.26	8.30	7.86	10.48	7.94	13.52	5.76	85.21
Molyneux.......	9	3.31	2.29	2.10	4.52	7.12	5.10	5.88	7.30	8.80	8.77	10.21	5.59	71.62
Lower Canada.	18	2.47	1.57	1.66	2.56	4.81	3.78	3.94	5.76	5.96	4.91	5.05	3.04	45.01
Upper Canada.	18	3.04	1.93	1.94	2.92	4.98	4.51	4.87	6.24	6.82	5.65	5.81	3.59	52.33
Wingfield	21	5.41	4.85	3.79	3.75	4.99	5.15	5.94	8.00	7.43	8.30	7.09	7.14	71.54
Basseterre	44	3.66	1.89	2.07	3.32	4.18	4.00	4.46	5.67	6.45	6.54	5.36	3.76	51.38

NOTE.—The number of years record involved is shown in first column. These estates are located on the accompanying map, fig. 2.

TABLE 3.—*A comparative study of the rainfall on four of the Leeward Islands for the year* 1895.

Islands.	No. stations	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	For year.
Montserrat.....	1	4.40	1.29	3.13	1.51	5.61	5.77	8.22	12.33	11.20	6.77	10.40	2.57	73.20
Antigua........	69	2.30	0.51	1.45	2.30	7.94	1.57	3.65	6.46	7.41	5.13	5.08	8.83	52.91
Nevis	13	3.56	1.29	2.12	1.35	7.67	3.97	3.09	7.49	7.31	5.95	5.00	4.52	53.32
St. Kitts........	35	2.66	1.41	1.13	2.00	9.86	2.66	4.82	7.54	8.48	4.94	3.14	6.41	56.61

NOTE.—The number of stations on each island reporting is shown in first column.

TABLE 4.—*Results of simultaneous observations at two stations.*

[The location of each station is shown on the map, fig. 2.]

FOUNTAIN ESTATE, ST. KITTS.

[Elevation about 850 feet above sea level.]

Months.	Temperature.						Precipitation.	
	Monthly mean.		Highest (obs.).	Date.	Lowest.	Date.	Amount.	No. days with .01 inch or more.
	8 a. m.	Minimum.						
1900.	°	°	°		°		*Inches.*	
February	75.4	67.8	80	26	65	15	0.79	5
March..........................	74.7	67.4	82	30	64	23	2.12	15
April	77.0ª	68.7ª	85	1, 24	64	7	4.98	20
May	79.1ª	71.2ª	84	12	70	5	1.28	11

UNITED STATES WEATHER BUREAU, ST. KITTS.

[Elevation 29 feet above sea level.]

Months.	8 a. m.	Minimum.	Highest (obs.).	Date.	Lowest.	Date.	Amount.	No. days with .01 inch or more.
February	78.2	73.5	80	26	70	28	0.15	2
March..........................	77.4	72.7	83	30	69	12	1.04	5
April	78.2	73.0	86	28	68	19	2.64	18
May	80.8	75.2	82	3	68	14	0.42	7

ª One observation missing.

TABLE 5.—*Results of meteorological observations.*

Time.	Estimated elevation.	Barometer (actual).	Thermometer. Dry.	Thermometer. Wet.	Relative humidity.	Remarks.
	Feet.	*Inches.*	°	°		
8:30 a. m..	1,000	29.02	74.2	69.5	79	Open pasture; sun shining.
9:00 a. m..	1,500	28.52	68.0	67.0	95	Under a tree; cloudy.
9:30 a. m..	2,000	27.86	66.0	....	......	In the forest; sun shining.
10:20 a. m..	2,740	27.17	63.8	63.0	97	Lip of crater; low forest; overcast.
11:00 a. m..	2,150	27.75	65.0	65.0	100	Open land; bottom of crater; rained immediately after.
1:05 p. m..	3,100	26.75	....	....	......	Lip of crater under the peak.

This table presents the results of meteorological observations made by Drs Christian and Edmond Braush and Mr. George King on April 22, 1900, while exploring the crater of Mount Misery. The barometer used was an aneroid and was set the day before to read with the barograph at this station. The thermometers were supplied from this office.

NOTES ON LOCAL WHIRLWINDS IN NEW BRUNSWICK.

By SAMUEL W. KAIN.

The province of New Brunswick is very rarely visited by violent storms, and the undesirable phenomena due to atmospheric disturbances have been recorded only at long intervals.

The tornadoes and cloudbursts which are reported so often from the west and south are happily almost unknown here.

Still it must not be forgotten that we have had such storms. On August 17, 1898, a tornado of considerable violence swept over the parish of Dumfries, York County, and in the United States WEATHER REVIEW for March, 1898, I have described a cloudburst observed near Sussex on August 1, 1897.

It may therefore be of some interest to briefly describe a small whirlwind observed at 4 p. m. on the 24th of May, 1900, by Mr. Keith A. Barber. While Mr. Barber was standing by the side of a pool of water about six miles from Clarendon

Station, Charlotte County, he heard in the distance a shrieking, whistling sound; this continued to increase in intensity, and turning to seek a cause he noticed a whirlwind advancing from the hills, its course indicated by the swaying shrubs and a noise somewhat like that produced by a express train, but not so loud. It struck the pool about three feet from the shore, and raised the water in a foaming mass of froth and spume to a height of 5 feet, and crossing threw the water upon the farther shore. Its path across the pool was about 15 feet wide. Mr. Barber was standing about one hundred feet from the path of the whirlwind. The sky was clear all day. In the morning there were a few light clouds, but after 2 p. m. the sky was cloudless.

The wind was northeast till noon, then shifted to southwest and south. It was light all day. The barometer was steady; at 8 a. m., 30.081; at 2 p. m., 30.129; at 8 p. m., 30.185. In St. John the highest temperature was 65° F., but at Clarendon the temperature was probably about 5° higher, the preceding days had been cold, and the change in temperature was considerable and rapid.

A very similar phenomenon was observed on Wednesday, June 14, at Grassy Lake, Kings County.

Dr. Colter, post office inspector, and Mr. Richard Magee, of the railway mail service, were fishing from a moored boat on the lake. It was a fine, clear day, and a good breeze was blowing when about 2 o'clock in the afternoon they heard a roaring in the woods, and with a rushing noise a few hundred feet from them the water of the lake commingled with reeds, lillies, and mud was torn up and hurled into the air, forming a waterspout apparently about 30 feet in diameter.

It lasted about two minutes, and for about that time the air seemed somewhat darkened. The violence of the wind drew their boat from its moorings in among the reeds, and it was fortunate that they were far enough from the path of the whirlwind to escape any more serious results.

LIGHTNING FROM A CLOUDLESS SKY.

By CHARLES E. ASHCRAFT, JR., Weather Bureau, Roseau, Dominica, W. I., dated November 14, 1900.

The phenomenon of lightning from a cloudless sky seems to be regarded in the States as one of very rare occurrence, as it very likely is. I can not remember of ever observing it while in the States, but down here in the West Indies it is of very frequent occurrence, so frequent in fact that it is not regarded as remarkable by the people. When first I saw this phenomenon after arriving in the tropics it caused me considerable wonder, and I was also in doubt as to whether it was real lightning or not. So I made inquiries among the residents and found to my surprise that it occasioned no wonder to them, and they evidently failed to understand why it should to me. Subsequently I have observed it numerous times, till finally the novelty has worn off, and I, like the residents, accept it now as only an ordinary occurrence. However, I believe this letter is justified, inasmuch as the phenomenon is rare in the States and any information relating thereto may be welcome.

The appearance of the flash is that of sheet lightning, generally single flashes being seen at intervals of from two to five minutes, and again only two or three occasional flashes will be seen during an evening. They do not seem to be confined to any particular quarter of the sky for local reasons, as I have observed them in all quarters. I do not think flashes are due to falling meteors, but they may be the reflected flashes of distant thunderstorms, although a clear sky certainly does not offer so good a reflecting surface as a clouded one. However, I am inclined to believe that the theory of the exchange of electricities between vertical currents of air is a very plausible explanation for the following reasons: In the first place the phenomenon has *always* been observed in the evening, usually between 7 and 9 p. m., never before 7, I believe, but several times after 9 o'clock. As this latitude is free from the disturbing effects of ever-passing areas of high and low pressure, the diurnal phases of the weather are therefore very constant and much alike from day to day. So that ordinarily between 7 and 9 p. m. the temperature falls, cool breezes spring up, a rapid clearing condition sets in, the clouds disappearing sometimes like magic, and by 9 p. m. the sky is usually clear. Now, it is always at this time when the colder currents of air are descending, causing the cool breezes and clearing condition and setting up a vertical circulation with steep gradients, that the lightning is seen. Sometimes the sky is not absolutely clear, a few clouds nearly always hanging over the mountains to the east of station, but the lightning will be seen far out to sea, perhaps, to the westward, where not the least vestige of cloud is visible. Then it is about this time in the evening that the maximum electrification of the air occurs, and in view of the fact that the lightning always occurs at the one time, is it not probable that the exchange of electricities between the descending and ascending currents having different temperatures and humidities, and therefore different electrical potentials, is the cause thereof.

I may add that these lightning flashes have been observed more frequently during the hurricane season, but just what weather conditions prevailed on the dates of occurrence I am unable to say, as I failed to make note of the dates. Furthermore, the phenomenon can not be peculiar to the region of Dominica alone, as I have talked to a number of persons who have lived long in tropical parts, and they are all agreed that lightning from a clear sky is no uncommon thing. By way of suggestion it might be worth while to question the observers of the West Indian and other tropical stations on the matter, and in this way considerable information might be adduced.

MEXICAN CLIMATOLOGICAL DATA.

Through the kind cooperation of Señor Manuel E. Pastrana Director of the Central Meteorologic-Magnetic Observatory the monthly summaries of Mexican data are now communicated in manuscript, in advance of their publication in the Boletin Mensual. An abstract, translated into English measures, is here given, in continuation of the similar tables published in the MONTHLY WEATHER REVIEW since 1896. The barometric means have not been reduced to standard gravity, but this correction will be given at some future date when the pressures are published on our Chart IV.

Mexican data for November, 1900.

Stations.	Altitude.	Mean barometer.	Temperature. Max.	Temperature. Min.	Temperature. Mean.	Relative humidity.	Precipitation.	Prevailing direction. Wind.	Prevailing direction. Cloud.
	Feet.	*Inch.*	°*F.*	°*F.*	°*F.*	%	*Inch.*		
Leon (Guanajuato)...	5,934	24.35	79.3	37.6	60.8	59	1.01	n.	e.
Mazatlan	25	29.93	85.8	68.4	77.2	74	....	nw.	nw.
Mexico (Obs. Cent.)..	7,472	23.10	74.3	40.1	57.0	57	0.32	n.	ne.
Morelia (Seminario)..	6,401	24.02	74.8	42.8	57.7	67	1.28	w.	w.
Puebla (Col Cat.)....	7,112	23.43	76.8	39.0	60.8	65	0.59	e.	w.
Puebla (Col. d'E.)....	7,116	23.34	78.4	45.3	63.1	64	0.71	ene.	sw.
Saltillo (Col. S. Juan).	5,399	24.84	78.8	39.2	56.8	81	1.65	ne.	n.
San Luis Potosi......	6,202	24.15	78.8	40.5	58.8	67	1.44	e.	e.
Tampico...............	38	30.08	86.0	52.2	71.6	72	0.38	se.	....

OBSERVATIONS AT HONOLULU.

Through the kind cooperation of Mr. Curtis J. Lyons, Meteorologist to the Government Survey, the monthly report of meteorological conditions at Honolulu is now made partly in

accordance with the new form, No. 1040, and the arrangement of the columns, therefore, differs from those previously published.

Meteorological Observations at Honolulu, November, 1900.

The station is at 21° 18′ N., 157° 50′ W.

Hawaiian standard time is 10^h 30^m slow of Greenwich time. Honolulu local mean time is 10^h 31^m slow of Greenwich.

Pressure is corrected for temperature and reduced to sea level, and the gravity correction, −0.06, has been applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force, or amounts of cloudiness, connected by a dash, indicate change from one to the other.

The rainfall for twenty-four hours is measured at 9 a. m. local, or 7.31 p. m., Greenwich time, on the respective dates.

The rain gage, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 43 feet, and the barometer 50 feet above sea level.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p. m., Greenwich time, or 2.29 a. m., Honolulu time.									Total rainfall at 9 a. m., local time.
				Temperature.		Means.		Wind.		Average cloudiness.	Sea-level pressures.		
		Dry bulb.	Wet bulb.	Maximum.	Minimum.	Dew-point.	Relative humidity.	Prevailing direction.	Force.		Maximum.	Minimum.	
	*	†	†			‡	‡		§				
1	29.97	75	68	80	70	66.3	70	ne.	6-4	5	30.02	29.94	0.02
2	30.04	74	67	80	74	65.7	68	ne.	3	3	30.08	29.95	0.19
3	30.05	70	66.5	79	69	62.7	66	ne.	6-4	5-3	30.11	30.03	0.60
4	30.02	71	64	76	67	62.5	72	ne.	4-5	8-5	30.11	30.02	0.13
5	30.01	71	64	76	66	60.7	64	ne.	3	5	30.07	29.97	0.05
6	29.98	72	64.5	78	68	62.3	68	ne-nne.	2-0	2-6	30.04	29.95	0.07
7	29.94	73	66	78	69	63.0	70	nne.	3	3	30.04	29.93	0.08
8	29.89	65	63	78	68	64.3	72	nne.	1-3-0	10	29.95	29.88	0.00
9	29.89	75	68	79	65	65.3	78	sw.	1-0	6	29.94	29.84	0.00
10	29.96	72	62.5	77	72	61.5	65	n-nne.	4-6	5-2	29.98	29.91	0.00
11	30.01	73	63	76	72	55.7	53	nne.	6	2-5	30.06	29.95	0.00
12	30.00	72	63	74	72	59.3	63	n-ne.	3-4	8	30.08	29.89	0.10
13	29.90	69	63.5	77	72	58.7	60	ne.	3-0	3	30.02	29.89	0.02
14	29.79	72	66	77	67	61.0	67	nne.	2-0	8-3	29.91	29.79	0.00
15	29.60	76	74	77	69	67.0	83	nne-s.	2-0-3	10	29.79	29.61	2.50
16	29.69	73	72.5	79	72	73.3	89	sw.	3-5	10	29.73	29.57	1.50
17	29 84	73	70	78	71	70.0	91	s-sw.	0-1	10-7	29.86	29.71	0.03
18	29.86	75	73	81	69	74.0	86	s-sw.	3-0	9-7	29.89	29.80	0.02
19	29.98	76	74.5	81	75	74.3	88	ssw.	2	8	29.99	29.86	0.01
20	29.98	68	67.5	83	76	72.5	86	ssw.	2-0	7-0	30.02	29.94	0.00
21	29.95	70	68.7	84	68	69.7	88	sw.	1-0	1-6-0	30.02	29.95	0.00
22	29.94	68	67	84	68	69.5	85	ssw.	1-0	4	29.98	29.89	0.00
23	29.96	69	67.5	83	67	69.7	85	sw-w.	1-0	0-5	29.98	29.90	0.02
24	29.94	74	69	80	67	67.3	79	nw-nne.	0-4	6	30.00	29.90	0.03
25	29.94	74	68.5	78	73	66.7	73	ene.	4-2	9-10	30.02	29.93	0.30
26	29.84	72	71.3	77	71	67.7	81	ne.	2	10	29.90	29.89	5.45
27	29.89	70	69.3	75	71	71.7	96	ne-w.	1-0	10	29.94	29.86	0.23
28	29.90	69	68.3	80	70	70.7	89	s.	1-0	7-10	29.93	29.85	0.00
29	29.93	75	69.5	80	69	69.3	84	sw-ne.	1-2	10-7	29.96	29.86	0.00
30	29.94	72	67	80	72	67.0	75	ne.	2-0	7-3	29.99	29.89	0.00
Sums.	......	......	......	......	......	......	......	....	......	......	......	......	11.30
Means.	29.921	71.9	67.6	78.8	69.9	66.3	76.6	....	2.2	5.7	29.983	29.882	.....
Departure.	−.028	......	......	......	......	+0.6	0.0	....	......	+1.1	......	......	+5.78

Mean temperature for November, 1900 (6+2+9) ÷ 3 = 74.1; normal is 73.8. Mean pressure for November, 1900 (9+3) ÷ 2 = 29.929; normal is 29.957.

*This pressure is as recorded at 1 p. m., Greenwich time. †These temperatures are observed at 6 a. m., local, or 4.31 p. m., Greenwich time. ‡These values are the means of (6+9+2+9) ÷ 4. §Beaufort scale.

RECENT PAPERS BEARING ON METEOROLOGY.

W. F. R. PHILLIPS, in charge of Library, etc.

The subjoined list of titles has been selected from the contents of the periodicals and serials recently received in the library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau:

Annalen der Physik. Leipzig. Vierte folge. Band 3.

Fischer, K. T. Ein neues Barometer (Luftdruckaräometer). P. 428.

Wedell-Wedellsborg, P. S. Notiz über die Ursachen der seculären Variationen des Erdmagnetismus. P. 540.

Wien, W. Zur Theorie der Strahlung schwarzer Körper, Kritisches. P. 530.

La Nature. Paris. 28me année.

Durand-Greville, E. Le nuage en sac ou mammatus. P. 401.

Geographische Zeitschrift. Leipzig. 6 Jahrg.

Koeppen, W. Versuch einer Klassifikation der Klimate, vorzugsweise nach ihren Beziehungen zur Pflanzenwelt. P. 593.

Bulletin of the American Geographical Society. New York. Vol. 32.

Turner, E. T. The Climate of New York. P. 101.

Nature. London. Vol. 63.

Lockyer, (Sir) Norman, and Lockyer, W. J. S. Solar Changes of Temperature and Variations in Rainfall in the region surrounding the Indian Ocean. P. 107.

Frankenfield, H. C. Kite Work of the United States Weather Bureau. P. 109.

Liveing, G. D. and Dewar, J. Spectroscopic Investigations of Gases in Atmospheric Air. P. 189.

Scientific American. New York. Vol. 83.

—— Shooting at the Clouds [for dispelling hail]. P. 371.

Scientific American Supplement. New York. Vol. 50.

Cordeiro, F. P. Tropical Hurricanes. P. 20858.

Ciel et Terre. Bruxelles. 21me année.

Hepites, S. Pluie extraordinaire en Roumanie. P. 442.

Sieberg, A. Funkenblitz. P. 261.

Quarterly Journal of the Royal Meteorological Society. London. Vol. 26.

Symonds, G J. Wiltshire Whirlwind of October, 1899. P. 261.

Marriott, William. Rainfall in the West and East of England in Relation to Altitude above Sea Level. P. 273.

Baxendell, Joseph. Description of Halliwell's Self-recording Rain Gage. P. 281.

Ackermann, Eugene. Climate and Diseases of Northern Brazil. P. 288.

Das Wetter Berlin 17 Jahrg.

Polis, P. Das meteorologische Observatorium Aachen. P. 241.

Kassner, C. Meteorologische Beobachtungen auf einer Reise nach Bulgarien. P. 245.

Stade, H. Winterbilder vom Brocken. P. 258.

Archives des Sciences Physiques et Naturelles. Genève. 4me Période. Tome 10.

Gautier, R. Résumé météorologique de l'année 1899 pour Genève et le Grand Saint Bernard (suite). P. 467.

Zeitschrift für Gewässerkunde. Leipzig. Band 3.

Ototsky, P. Der Einfluss der Walder auf das Grundwässer. P. 153.

CLIMATE OF SPOKANE, WASH.

By CHARLES STEWART, Observer, Weather Bureau.

Spokane is situated in eastern Washington, in latitude 47° 40′ north, longitude 117° 25′ west, between the Rocky and Cascade mountains, at an elevation of about 1,900 feet above the sea level.

The United States Weather Bureau office in Spokane was established February 1, 1881, giving up to date, April, 1900, meteorological records for over eighteen years. In the preparation of the accompanying tables only *whole* years have been considered, leaving out the years 1881 and 1900, thus giving a record for eighteen years, from 1882 to 1899, both years inclusive.

Owing to limited space, it is not practicable to remark fully upon these tables, and we shall, therefore, simply make a few statements, principally bearing upon hygiene.

In comparing climates many people are inclined to be satisfied with a mere knowledge of the mean temperature, extremes of temperature, and, perhaps, the precipitation at a place; forgetting that several places may have an equality of temperature in every respect, etc., yet, owing to other important meteorological factors, differ widely as to climate.

The higher temperatures are shown to have risen above 90° each year, rising as high as 104°, August 8, 1898; this might lead one unacquainted with the climate of Spokane to suppose that prostration from heat, sunstroke, occurs at this place, but such is not the case; on the contrary, little inconvenience seems to accompany temperatures in this place that in other places induce prostration from heat, sunstroke is entirely unknown here, save by name.

There are two climatic factors worthy of particular attention with regard to Spokane, viz, the mean daily change of temperature, and the sensible temperature. The mean daily

change of temperature is the change from the mean temperature of one day to that of the following day. This change is sometimes known as variability of temperature, and is most important in determining the character of a climate; the more equable climates have the smallest changes of mean daily temperature. At Spokane the mean daily change of temperature for several years is 3.7°. This shows that the transition from cold of winter to heat of summer, or vice versa, occurs gradually by comparatively small changes of mean daily temperature from day to day. Sudden, violent changes of temperature seldom occur here.

In order to understand what is meant by sensible temperature let us take the definition given in the MONTHLY WEATHER REVIEW, 1895, p. 93; 1898, p. 362; and 1899, p. 18.

The sensible temperature experienced by the human body and attributed to the atmosphere, depends not merely upon the temperature of the air, but equally upon the dryness and the wind. The temperature of the wet bulb thermometer, as obtained by the whirling apparatus used in a shaded shelter, corresponds to the temperature felt by persons standing in the shade of trees or houses, exposed to a natural breeze of at least 6 miles per hour. This temperature and its depression below the dry bulb are the fundamental data for all investigations into the relation between human physiology and the atmosphere.

There is no difference in construction between the dry bulb and wet bulb thermometers, excepting that the thermometer selected as wet bulb has its bulb carefully covered with specially prepared muslin, and is dipped in pure water before observation, hence the terms dry bulb and wet bulb, for the purpose of indicating which thermometer is meant. Immediately after dipping in water evaporation may set in from the bulb of the wet thermometer. This evaporation produces lowering of temperature, and the drier the air the greater the difference between the readings of the wet bulb and the dry bulb, the reading of the latter indicating the temperature of the air.

To fully appreciate the hygienic value of a comparatively low sensible temperature during the warm seasons, consider the afternoon observation taken at Spokane, August 2, 1895. The temperature was 94° in the shade, and the temperature of the wet thermometer, or sensible temperature, was only 62°; that is, a person in good health and in the shade experienced only

Climatological data for Spokane, Wash., for eighteen years, 1882 to 1899.

Year.	*Barometer.			Temperature.				Rainfall and melted snow.			Distribution of rain during period critical for agriculture.			Wind.	
	Mean height.	Highest.	Lowest.	Mean annual.	Highest.	Lowest.	Annual range.	Total amount.	Agricultural year, greater part of September-June, ten months.		May.	June.	July.	Prevailing direction.	Highest hourly velocity.
	Inches.	Inches.	Inches.	°	°	°	°	Inches.		Ins.	Ins.	Ins.	Ins.		Miles.
1882	....	....	....	46.5	101.5	−17.0	118.5	25.99	1881-82	23.01	1.54	1.17	0.88	sw.	44
1883	28.01	28.68	27.33	46.8	96.7	−27.7	124.4	14.37	1882-83	22.06	2.11	0.60	0.00	sw.	37
1884	27.96	28.62	27.11	45.5	97.5	−17.8	115.3	20.56	1883-84	14.59	0.56	2.58	1.06	sw.	29
1885	27.98	28.50	27.43	50.1	99.3	−14.0	113.3	19.01	1884-85	18.84	1.53	3.40	0.39	sw.	33
1886	27.96	28.59	27.26	48.7	100.3	−10.5	110.8	15.86	1885-86	15.21	0.92	0.56	0.37	sw.	42
1887	27.98	28.61	27.15	47.2	97.3	−11.0	108.3	20.10	1886-87	18.69	1.06	2.07	1.41	sw.	31
1888	28.00	28.75	27.47	48.7	101.8	−30.5	132.3	17.69	1887-88	18.40	1.24	5.12	0.06	sw.	30
1889	28.00	28.57	27.41	49.1	96.0	−10.0	106.0	14.27	1888-89	12.35	1.70	0.39	0.46	sw.	30
1890	27.97	28.63	27.25	47.4	102.0	−23.0	125.0	16.57	1889-90	19.45	1.58	1.98	0.38	sw.	48
1891	27.95	28.58	26.98	49.0	97.0	−10.0	107.0	16.69	1890-91	12.35	0.60	3.28	1.12	sw.	48
1892	27.98	28.45	27.34	48.4	96.0	− 5.0	101.0	16.78	1891-92	14.45	2.40	0.72	1.22	s.	36
1893	27.97	28.60	27.28	45.7	99.1	−19.0	118.1	22.00	1892-93	20.08	2.50	0.42	0.36	s.	36
1894	27.97	28.61	27.32	48.2	97.5	− 1.9	99.4	17.84	1893-94	20.09	1.01	1.13	0.29	sw.	39
1895	28.00	28.52	27.27	48.0	95.0	8.0	87.0	13.46	1894-95	12.66	1.58	0.42	0.42	sw.	42
1896	27.96	28.56	27.38	48.6	100.0	−13.0	113.0	20.82	1895-96	14.78	2.29	0.73	0.17	sw.	37
1897	27.96	28.56	27.24	48.2	100.0	3.0	97.0	23.84	1896-97	21.43	1.05	3.51	0.98	sw.	37
1898	27.97	28.62	27.46	48.2	104.0	− 2.0	106.0	13.08	1897-98	18.64	1.63	1.21	0.43	s.	41
1899	27.94	28.50	27.23	47.2	98.0	−21.0	119.0	20.08	1898-99	13.27	1.02	0.56	0.30	s.	36
Average	27.97	.... 28.75†	.... 26.98‡	47.9	.... 104.0	.... −30.5	111.2	18.28		17.24	1.46	1.66	0.57	sw.	 48

Year.	Number of days.						Mean relative humidity.	Thunderstorms.	Number of days and month in which temperature fell below zero.	Winters during which the temperature did not fall below zero.	Mean daily change in temperature.	Average hourly velocity of wind.	Frost.			
													Last.		First.	
	Clear.	Partly cloudy.	Cloudy.	0.01 inch or more rain or snowfall.	Temperature rose above 90°.	Temperature fell below 32°.							Killing.	Light.	Light.	Killing.
							%				°	Miles				
1882	92	132	141	141	17	121	68.6	17	8, Jan.	....	.....	.....	Mar. 20	May 20	Sept. 30	Nov. 2
1883	181	126	58	94	14	136	67.1	2	6, Jan.; 11, Feb.	....	.....	.....	Mar. 16	Apr. 5	Nov. 2	Oct. 3
1884	113	151	97	123	10	128	69.4	10	7, Feb.; 9, Dec.	....	.....	.....	Apr. 18	May 13	Sept. 12	Sept. 7
1885	141	137	87	116	15	84	75.5	10	4, Jan.	....	.....	.....	Mar. 19	Apr. 25	Nov. 3	Oct. 5
1886	176	114	75	104	14	113	70.6	6	6, Jan.	....	.....	.....	Mar. 2	Apr. 5	Sept. 28	Oct 10
1887	105	153	107	126	15	137	73.2	8	9, Feb.	....	.....	.....	Mar. 4	May 7	Sept. 22	Sept. 20
1888	98	111	157	106	28	115	68.4	4	9, Jan.	....	.....	.....	Apr. 17	May 21	Sept. 23	Oct. 18
1889	74	132	149	97	19	115	64.0	5	1, Dec.	1888-9	3.7	.....	Feb. 19	Apr. 17	Sept. 24	none ...
1890	98	120	147	117	14	122	62.0	3	5, Jan.; 4, Feb.	....	3.7	4.1	Jan. 11	May 30	Sept. 12	none ...
1891	82	122	161	123	17	108	61.0	5	3, Mar.	....	3.7	5.3	June 8	May 9	Oct. 1	Nov. 13
1892	104	124	138	119	10	103	62.0	2	2, Jan.	....	3.4	5.5	Feb. 18	May 4	Oct. 16	Sept. 21
1893	78	105	182	144	12	123	68.0	4	1, Jan.; 3, Feb.	....	3.8	5.8	Jan. 15	June 20	Aug. 10	Oct. 14
1894	62	118	185	137	19	107	64.2	6	1, Jan.; 2, Feb.	1894-5	3.9	6.5	Apr. 3	June 11	Sept. 23	none ...
1895	81	126	158	98	8	121	60.0	5	none	1895-6	3.6	6.1	none ...	June 14	Sept. 6	none ...
1896	97	99	170	118	22	92	63.3	3	3, Nov.	....	3.4	6.0	Apr. 20	May 27	Sept. 16	Oct. 27
1897	118	69	178	134	17	119	66.0	8	none	1897-8	4.0	5.6	Apr. 12	Apr. 27	Sept. 9	Oct. 3
1898	131	97	137	101	21	119	62.0	7	1, Dec.	....	3.5	6.2	May 7	May 24	Oct. 1	Oct. 5
1899	90	112	163	134	8	95	65.0	5	5, Jan.; 4, Feb.	1899-00	3.9	6.4	Mar. 17	May 15	Sept. 7	Oct. 14
Average	107	120	138	118	16	114	66.1	6	....	....	3.7	5.8	Mar. 21	May 13	Sept. 24	Oct. 10

* Barometer corrected for instrumental error and temperature (actual atmospheric pressure).
† Highest. ‡ Lowest. The dash (—) indicates temperature below zero.

a temperature of 62°, although the air temperature at the time was 94°, a difference of 32° between the air temperature and the sensible temperature. This is worthy of notice, as it is somewhat explanatory of the freedom from prostration from heat sunstroke, for which this section is noted. The sensible temperature is influenced by the relative humidity, and the low relative humidity during the warm portions of the year is one of the most important factors in freedom from sunstroke at Spokane.

The preceding meteorological data are taken from the eighth annual report of the Board of Health of Spokane, Wash., for the year ending December 31, 1899.

The above tabular statement gives the average relative humidity for this place as 66.1 per cent, but during the warmer months of the year the relative humidity often falls in the afternoon, about the warmest part of the day, to as low as 10 per cent, sometimes lower. For example, at the afternoon observation (taken in Spokane at 5 p. m., Pacific time), August 16, 17, and 18, 1895, the relative humidity was respectively 8, 7, and 5 per cent, but at the morning observation (5 a. m., Pacific time), August 17, 18, and 19, the relative humidity had risen to 51, 52, and 53 per cent, showing that the air does not remain long enough dry to be hurtful in some respects.

Each year, excepting the years 1895 and 1897, the temperature has fallen below zero at Spokane, but it is also shown that during the winters of 1888–89, 1894–95, 1895–96, 1897–98, and 1899–1900, the temperature did not fall as low as zero at this place. The lowest temperature recorded at Spokane since the opening of the Weather Bureau office here was 30.5° below zero, January 16, 1888, but it should be borne in mind in this connection that the winter of 1887–88 was one of great severity throughout the whole country. The lower temperatures do not prevail for many days at a time, but have days with much higher temperature between them.

The prevailing winds are from the southwest, and have a marked influence in tempering the cold of winter or heat of summer. The greatest velocity of wind ever recorded at Spokane was 48 miles per hour, once in 1890 and once in 1891, lasting for about five minutes each time; this place has remarkable freedom from violent winds, due in a great measure to the topography of the surrounding country.

Thunderstorms are rare and seldom if ever of the violent kind experienced in the Eastern States, many of the thunderstorms recorded in the following table have been reported for only a peal or two of distant thunder.

It has been estimated by agricultural experts that from 15 to 20 inches of precipitation per year suffice for the production of good crops in the agricultural sections near Spokane. Weather Bureau reports referring to Washington and Oregon indicate that "Agricultural operations are more fruitful with a small rainfall than in some sections of other States with considerably larger precipitation." An examination of the preceding table which shows the amount of precipitation for the greater part of the agricultural year indicates that a sufficiency of precipitation for agricultural needs has always fallen in this section; and the same table shows that in general the rainfall has been well distributed during the period critical for agriculture.

The actual atmospheric pressure given in the first part of the tabular statement should be of interest to physicians and others from a physiological point of view.

FOG STUDIES ON MOUNT TAMALPAIS.

By ALEXANDER G. MCADIE, Forecast Official.

In a previous paper attention was called to the prevalence of fog on the central coast of California, especially in the vicinity of the Bay of San Francisco. A few illustrations of fog drifts as photographed at the Weather Bureau observatory on Mount Tamalpais were given in the July issue of the MONTHLY WEATHER REVIEW. The differences in temperature, humidity, and air motion are so marked within comparatively small distances, both horizontally and vertically, in the bay district, that it seemed advisable to tabulate in comparative form the meteorological elements for a year at the higher station (elevation approximately half a mile) and the station at sea level. The present paper aims to present, with some photographic evidence of fog forms and drifts, a rough study of the air drainage of the locality, in which fog streams and counter streams are of such frequent occurrence that they serve excellently as exponents of air motion. The topography of the section is remarkable, because of the close juxtaposition of ocean, bay, mountain, and foothill. A valley, level as a table, 450 miles long and 50 miles wide, having afternoon temperatures of 100° or over, is connected by a narrow water passage with the Pacific Ocean, the mean temperature of the water in this locality being 55°. Thus within a distance of 50 miles in a horizontal direction there is frequently a difference of 50° in temperature, while in a vertical direction there is often a difference of 30° in an elevation of half a mile. High bluffs, ridges, and headlands are at such an angle to the prevailing strong westerly surface air currents that an air stream is forced with increased velocity through the Golden Gate, and there must of necessity be considerable piling up of both air and water vapor at this point. The locality may indeed be considered as a natural laboratory, in which experiments connected with cloudy condensation of water vapor are daily wrought, and it is therefore of more than passing interest to the meteorologist.

Much faithful work has been done in physical laboratories on the behavior of water vapor at varying volumes, pressures, and temperatures. Regnault, Thomson, Broch, Aitken, Kiessling, R. von Helmholtz, Hertz, Rayleigh, von Bezold, Barus, Marvin, and others have worked upon the change of state from vapor to liquid and from liquid to solid, and while many irregularities are noted in the behavior of water vapor, the general problems of decreasing volumes and increasing pressures until condensation points are reached, have been solved; and it is well understood that the vapor-liquid and liquid-solid condensations are in themselves but two phases in a chain of condensation phenomena. The problem of fog is therefore a limited one. It may be considered as a special case of cloud development, occurring in the first and second stages of Hertz, viz, the unsaturated and saturated stages. Condensation in the free air, as in these fog formations, takes place under conditions different from those obtaining in the laboratory. There are no fixed restraining walls, though the strongly stratified outlines suggest sharply limited air streams. Again saturation as it occurs in free, constantly changing air and true adiabatic saturation are not identical. Saturation in the free air must be studied under disadvantageous circumstances, for the work must be done at a distance, with instruments neither sufficiently delicate nor accurate, and there is no control of conditions possible. In passing, it may be noted that, except for traces of salt, the air of the section under consideration is partially filtered, as it presumably comes from off the broad ocean and is as free from land dust and smoke as normal air can be. Off-shore winds are infrequent and light.

An attempt has been made at the Mount Tamalpais station to correlate the surface pressure conditions with fog. There are, however, many different types of fog. The conditions prevailing in winter, when tule fog, formed in the great valleys, drifts slowly seaward, are very different from those prevailing in summer, when the sea fog is carried inland. A typical pressure distribution accompanying sea fogs has been

recognized. In general, a movement southward along the coast of an area of high pressure in summer means fresh northerly winds and high temperatures in the interior of the State, with brisk, westerly winds, laden with fog, on the coast.

A kite meteorograph at the station has been used frequently in the following way: A descent from the station to sea level can be made by the train, a distance of 8 miles, in fifty minutes. The meteorograph was attached near the top of an open canopied car, insuring a good circulation, and carried in this way a number of times through the fog. We make in this way a rough cross section of the fog.

In fig. 1, Plate I, is shown perhaps the most common type of fog. It may be of interest to compute roughly the weight of water vapor existing under such conditions. From a number of records, a fair average dew-point temperature is 51° F. (10.6° C.). It is estimated that an area 10 miles east and west and an equal distance north and south is covered with fog. The upper level of the fog may be taken as half a mile. If the fog were solidly packed, we could not be much in error if we estimated its bulk at 50 cubic miles.

There are, therefore, $5280^3 \times 50$ cubic feet of water vapor at a mean temperature of 51° F. A cubic foot of vapor at this temperature weighs 4.222 grains, and we therefore have as a gross weight 2,219,535 tons of 2,000 pounds each. But most generally the fog disappears between sea level and 1,200 to 1,500 feet altitude, and there are also wide swaths or channels fog free. The amount given above, therefore, would need to be cut in two, and a liberal estimate of the weight of the water vapor in a fog outside the Heads is 1,000,000 tons. This is carried through the Golden Gate by westerly winds, blowing 22 miles per hour, from 1 to 5 p. m.

For each square mile of surface there would be about 10,000 tons of water vapor and for each acre about 15.63 tons. This is equivalent to a rainfall of 0.14 inch.

In Waldo's Modern Meteorology[1] an example in the use of Hertz's graphical tables for following the changes in a given quantity of water vapor under varying conditions is given. With little change, the problem will apply in this case.

At San Francisco the mean actual pressure is 29.87 inches (758.7 mm.) and at Tamalpais 27.55 inches (699.8 mm.); the elevation of the latter station is 724 meters, and the former is practically at sea level.

With a pressure of 750 mm. and a temperature of 27° C. (80° F.), a given mass of air, half saturated, lifted upward under adiabatic conditions, will not change its initial 11 grams of water contents per kilogram, until at an elevation of 640 meters, when condensation would begin. At an elevation of 700 meters, the pressure being 687 mm., the temperature would be 19.3° C. (67° F.).

At 640 meters the dew-point would be 13.3° (56° F.) or 2.5° lower than the initial dew-point 15.8° (60° F.), the difference being due to the increased volume. At 1,000 meters the temperature would be 8.2° C. (49° F.), or at a rate of 0.51° C. decrease per 100 meters elevation.

It is pointed out, however, that in all theoretical values the assumption is made that the kilogram of mixed air and water vapor retains its mass unchanged, but this can not be the case with a mixture in free air performing a journey of any extent. It is also to be remembered that in the actual case before us the horizontal movements of the given mass would be of far more significance than the vertical movements.

In von Bezold's third paper on the Thermodynamics of the Atmosphere (see Mechanics of the Atmosphere, pp. 257–288), the effect of mixing different air masses is considered. If two masses of saturated air at 0° C. and 20° C., respectively, and at 700 mm. pressure are thoroughly mixed, the greatest amount of rainfall that can occur is 0.75 gram per kilogram of air and water vapor. The temperature of the mixture will be 11° C. (52° F.). The warmer mixture would have yielded the same amount of rainfall by raising it 310 meters or cooling it 1.6° C. by elevation and 0.8° C. by contact.

Direct cooling by contact or radiation is shown by von Bezold to be more efficient as a cause of rainfall than cooling by mixture, but in the production of fog it is probable that cooling by mixture (except in the case of ground fogs) is the most important factor to be considered. It is to be noted that reverse pressures should also be studied, for perhaps a close watch upon the conditions prevailing when fog is rapidly dissipating might conversely throw light upon the order and relative importance of the three ways of cooling, viz, mixture, expansion, and radiation.

Von Bezold's deductions may be thus summarized: More vapor condenses when a stream of air and vapor at low temperature impinges on a mass of warmer air than with reversed conditions. Ocean fogs as a rule form when cool air flows over warm, moist surfaces, but in the case under discussion, where the ocean surface temperature is 13° C. (55° F.) and the air temperature may reach 27° C. (80° F.), it is evident that the above does not hold. It is more probable that condensation is the result of the sharp temperature contrasts at the boundaries of certain air currents having different temperatures, humidities, and velocities, and that the contours of the land play an important part in originating and directing these air currents. The summer afternoon fogs of the San Francisco Bay region then are probably due to mixture, more than radiation or expansion. The winter tule fogs of the Sacramento and San Joaquin valleys are probably pure types of radiation fog, where the process of cloud building is from the cooled ground upward. Occasionally in summer, when the warm air has been pumped out of the valleys and there is rapid radiation, ground fog forms. An illustration of this is given in fig. 2, Plate I, where fog covers a number of valleys. Summer sea fog is shown in fig. 3, Plate II, and, as said above, is probably due to mixture. The wave motions or Luft Wogen of von Helmholtz are shown in fig. 4, Plate II, and also the surgings or splashings, where a certain condensation results from the mechanical uplifting.

[1] Page 236. The paper in full is translated in Professor Abbe's Mechanics of the Earth's Atmosphere, No. XIV, pp. 198–211. [Improved methods are given by Professor Bigelow in his Report on the International Cloud Observations, Washington, 1900.—ED.]

THE WATER SUPPLY FOR THE SEASON OF 1900 AS DEPENDING ON SNOWFALL.

On November 9 the Chief of Bureau called for reports from the section directors for Colorado, Idaho, Montana, New Mexico, Utah, and Wyoming on the water supply of the last season, the value of snow data published in special snow bulletins, and the verification of any predictions based upon the experience of past seasons. The replies summarize the work done in the respective sections, and especially the data published in the special bulletins and the ice and snow charts of the Climate and Crop Division during the early spring of 1900. No better method of presenting this important subject to our readers could be desired than the publication of these excellent reports, which follow herewith. The importance of forecasting the supply available for irrigation was discussed by the Chief of Bureau and others at the Irrigation Congress held in November in Chicago.—ED.

COLORADO.

By F. H. BRANDENBURG, Section Director.

The Weather Bureau began the collection of snowfall statistics in Colorado four years ago, believing that it would be possible to forecast accurately the prospective volume of water in the streams, and that such information would be of material advantage to agricultural interests.

In the early days, when agricultural operations were necessarily limited, the flow during summer was of comparatively little moment, but with the increase of population agriculture

made rapid progress, and to supply the demand large canals took the place of the small ditches which had been constructed here and there by a few farmers. Many of these canals possess a capacity equal to the entire flow of the streams supplying them, and vast areas were brought "under ditch," regardless of the fact that during midsummer a shortage might reasonably be expected. While agriculture by irrigation has reached a high state of development in Colorado—unrivaled elsewhere in the arid region—its further extension under existing conditions is impossible. The amount of water that reaches the streams during the summer season is undoubtedly smaller now than it was a quarter of a century ago, and, while greater economy in its use has become necessary, a scarcity is common, and droughty conditions during the summer months entail great loss. Deforestation and forest fires have removed large tracts of timber—nature's reservoirs in the mountains—so that the amount of moisture conserved till midsummer is rapidly growing less under the unobstructed action of the sun and winds. What is true of Colorado is, or soon will be, equally true of other mountain States of the arid region unless strenuous efforts are made to reforest the devastated areas and to protect the timber still standing. If, on account of close grazing during recent years, the run-off from the treeless plains is rapid as compared with years ago, when undisturbed vegetation conserved the moisture, is it unreasonable to expect a similar effect to follow the close grazing which is now common during summer in the upper parts of the catchment basins and during the entire year in the timber of moderate elevations?

A study of the snowfall data collected during recent years does not bear out the notion so prevalent in the arid region, i. e., that a winter of heavy snowfall is succeeded by a spring and a summer with copious and well-distributed precipitation. The data have also thrown light on the volume and duration of the flow to be expected. From the bare knowledge that there is an unusually large amount of snow in the mountains, we must not conclude that there will be an ample and prolonged flow. In illustration of this important fact, I shall briefly review the conditions that have recently obtained: During the closing months of 1898 the snowfall along the Continental Divide and adjacent regions in Colorado was greater than experienced for many years. January added 15 per cent and February a like amount, stormy weather having been almost continuous, with plenty of wind to sweep the snow into the gulches and ravines. March was even wetter than any of the four preceding months. As compared with the stupendous amounts that fell during that season, the winter of 1899–1900 was dry, especially during January and March, though October contributed a heavy fall, and February less than the normal amount for the region as a whole. It thus appears that the winters were notably different. The spring of 1899 was practically rainless, that of 1900 exceptionally wet. The summer of 1899 had slightly more than the normal precipitation, while the summer of 1900 was droughty. We now come to the water supply: the volume available during the spring and summer of 1899 was inadequate on the eastern slope, except for a brief period in June, notwithstanding the stupendous amount of snow that fell during the preceding winter. In 1900 irrigation enterprises fared better during spring and part of summer, despite the light snowfall of the preceding winter. The anomaly is explained by the fact that in consequence of the long, dry period which preceded the stormy winter of 1898–99, the ground was dry and unfrozen when the first snow fell, hence it absorbed a vast amount of moisture when melting began. The unusual dryness during spring played an important part for, as is usual in droughty times, high winds, desiccating in character, were almost continuous, honey-combing the snow and causing a large proportion to disappear as if by magic. When the winter of 1899–1900 set in the ground was well supplied with moisture and frozen, as a rule, so that in the spring, which was notably free from high winds, the run-off reached the streams with comparatively little loss and being augmented by seepage from the unprecedented fall of rain and melted snow during April (about ten inches) a satisfactory flow was maintained until about the middle of July. From this comparison it appears that the following considerations are important: Whether or not large amounts fall in autumn and early winter, the condition of the soil when winter sets in, the temperature during May and June, and the precipitation during summer, rather than the total snowfall of the winter, are the essential factors in determining the duration of a material flow.

In diverting water from those of the larger streams of the middle Rocky Mountain region that have their sources west of the Continental Divide, difficult problems in engineering are encountered, hence dependence must be placed on the small streams whose flow is likewise unfavorably affected by the conditions already mentioned.

Snowfall bulletins are regularly published at the close of December and monthly thereafter during the season. They contain data regarding the condition of the soil, whether wet or dry, free from frost or not, at the time stormy weather set in; the fall of snow compared with that of like period the preceding year; a comparison with the normal or average; the depth at timber line and above, together with a statement regarding the prospective flow. In the first bulletin of the past season, in addition to summarizing the conditions as reported, the prediction was made that the run-off from melting snow would be relatively great and rapid. In the January bulletin attention was called to the fact that the current fall scarcely made good the loss by evaporation; that for February contained the statement that as recent falls were loosely packed they were likely to go quickly, and that for March the forecast that the run-off from high elevations would not be as great as during the preceding year and cease much earlier. Full data regarding the phenomenally heavy fall of rain and snow over the eastern half of the State during April were promptly placed before interested persons, together with a statement regarding the heavy flow to be expected from the foothills during the early part of the season. It is gratifying to note that all conclusions of a predictive character were fully verified.

The bulletins have a wide circulation. Every post office in the State is furnished with a copy for display, and a large demand for copies comes from the residents of western Nebraska, western Kansas, New Mexico, and as far west as southern Nevada and Arizona.

It is evident that the conditions as regards protection to the snow in the mountains are not such as to conserve till late in the season anything near the amount of moisture needed to irrigate the extensive areas now under ditch. The results attained during recent years emphasize the fact that however stupendous the snowfall of winter, crops are sure to suffer during summer unless normal rainfall occurs.

IDAHO.

By S. M. BLANDFORD, Section Director.

In accordance with authority granted this office by the Chief of Bureau to issue special snow bulletins during the winter of 1900, three bulletins showing depth of snow in all parts of Idaho were issued on dates as follows: January 31, February 28, and March 31.

To secure uniformity and to allow of intelligent comparison, the bulletins were modeled after those previously issued by the Colorado section and represented the snowfall as com-

pared with the average amount on ground, amount at timber line, depth at or near the summit of mountains, and prospective water flow.

It was ascertained through the information contained in the bulletins that nearly all the snow that fell in December, 1899, disappeared during January, 1900, through the prevalence of adiabatic conditions and exceptionally mild weather; nearly normal temperature conditions prevailed during February and the snowfall slightly increased in some sections, but rapidly disappeared during March, when the temperature was the highest for any March on record. The March bulletin disclosed the fact that the snowfall in the mountains had been decreasing since the latter part of December, 1899.

In the bulletin issued on the 31st of March, 1900, the conditions then existing were expressed as follows:

During the first decade of March light snow fell on the mountains to an appreciable depth, but the temperature having risen considerably above the normal on the 11th and continued mild throughout the month, resulted in lighter measurements of snow at the close of March than at any time since December 31, 1899. At the timber line the snow has decreased materially, and on the summit of the mountains the decrease was greater over the Snake River watershed than the Columbia. In agricultural districts there is practically no snow on the ground to obstruct farming operations and the ranges are open to the herdsman.

Since the estimates of depth of snow in the mountains range from a quarter to half the average, it is evident that the water flow will be considerably less than the average, and that the need for economy in the use of water will arise before midsummer.

The forecast was deduced from the measurements of snow in the mountains, assisted by the remarks of correspondents, which were generally to the effect that, within the memory of the oldest inhabitant, the mountain snow supply during the winter of 1899–1900 was the least ever known.

Value of special snow bulletins.—Immediately the first snow bulletin was issued to the public its value became evident. The newspapers considered the information of such interest as to publish extensive extracts, and the Idaho Daily Statesman published the first and each succeeding bulletin in full; many journals published the tabulated data in full. Those who appeared most eager to receive the bulletins were the mining men desiring to begin prospecting or placer mining. In this connection it was gratifying to this office to learn from mining men having extensive interests that the bulletins were of such value as to make individual efforts at collecting the same information through private correspondence unnecessary. The bulletins having been extensively distributed to stockmen, it was learned that they filled a long felt want. It appears that the southwestern valley sections of Idaho are especially desired by the sheep herders for wintering sheep, owing to the mildness of the climate. In the early spring bands of sheep begin to roam the prairies, keeping close to water. In the course of a season a band of sheep may travel from the Snake River to the Saw Tooth mountains and return, a distance of 400 to 600 miles or more, depending upon accessibility to water and grass. The snow bulletins enabled the stockman to ascertain the depth of snow on the high prairie lands and estimate the probable water supply.

Concerning predictive conclusions.—In the light of the experience during the past season it can be stated without hesitation that the forecasts of shortage of water were fully verified. In fact, all small streams had begun to recede by the close of May, and would have begun earlier, but for the occurrence of excessive precipitation during May. Large streams such as the Snake, Boise, and Payette rivers reached the lowest stage ever known, but continued to supply all the irrigation canals depending upon them. By July 20 the high prairies adjacent to the Boise and Saw Tooth mountains, the home of numerous herds of cattle, horses, and sheep were becoming dry, except for a few springs long distances apart, and glacial deposits in the Saw Tooth range that had been in existence from time immemorial, disappeared or dwindled into insignificance by midsummer. There was general suffering in many communities owing to lack of water. Streams of moderate size, which had supplied sufficient water for irrigation in previous years were entirely dry by midsummer, and it was necessary for herders to abandon good pasture for the purpose of securing water.

It was fortunate that the plan of securing snow records was inaugurated, since the bulletins issued during the winter of 1899–1900 will continue to form the base of reasoning for many years in determining the probable water supply.

Tabulated statement from the March bulletin showing condition of snow in Idaho on March 31, 1900.

Station.	County.	Compared with average.	Amount on ground.	At timber line.	At or near summit of mountains.	Prospective water flow.
Snake River watershed.		*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*
Afton	Wyoming	......	0	......	40	......
Bedford	.....do	—	8	......	24	......
Blackfoot	Bingham	—	0	0	12	—
Bryan	.....do	—	0	2	12	—
Coltman	.....do	—	0	?		—
Grover	Wyoming	......	3	......	36	......
Hatch	Bannock	—	0	0	36	—
Houston	Custer	—	0	24	36	—
Howe	Blaine	—	0	8	10	—
Idaho Falls	Bingham	—	0	0	trace	—
Labelle	Fremont	—	0	6	36	—
Lago	.....do	—	0	30	36	—
Lost River	Blaine	—	0	6	18	—
McCammon	Bannock	—	0	......	4	—
Oxford	.....do	—	0	12	48	—
Presto	Bingham	—	0	0	12	—
Rexburg	Fremont	—	0	0	?	—
Sarilda	.....do	—	0	0	6	—
Thayne	Wyoming	.....	0	......	8	......
Wilford	Fremont	—	T.	66	72	—
Bear River and lake drainage.						
Clifton	Oneida	—	0	3	24	
Fairview	.....do	—	0	12-20	48	—
Georgetown	Bear Lake	—	0	30	?	—
Mink Creek	Oneida	—	0	6	36	—
Ovid	Bear Lake	—	0	24	60	......
St. Charles	.....do	—	2	12	?	aver.
Wood River.						
Bellevue	Blaine	—	0	0	drifts	—
Ketchum	.....do	—	0	12	24	—
Corral	.....do	—	0	14	24	—
Boise basin.						
Centerville	Boise	—	0	drifts	30	—
Placerville	.....do	—	0	?	36	—
Owyhee Mountains.						
De Lamar	Owyhee	—	0	24	few ins	—
Sinker	.....do	—	0	18	18	—
Salmon River.						
Florence	Idaho	—	48	60	120	—
Mount Idaho	.....do	—	0	0	48-192	—
Salmon City	Lemhi	—	0	24-36	36-60	—
Shoup	.....do	—	0	aver.	aver.	—
Columbia River watershed.						
Bellgrove	Kootenai	—	0	?	....	—
Burke	Shoshone	—	T.	96-120	120-174	—
Bonners Ferry	Kootenai	—	0	......	120-144	—
Kamiah	.....do	—	0	......	48	—
Hope	.....do	—	0	0	18	—
Kingston	Shoshone	—	0	2	24	—
Kootenai	Kootenai	—	12	36	72	—
Rathdrum	.....do	—	0	0	24	—
Santa	.....do	—	0	drifts	12	—

NOTE.—The dash (—) is used where fall has been less than average or where prospective water flow is likely to be less.

MONTANA.

By E. J. GLASS, Special Director.

Montana is drained by three large rivers, the Missouri and Yellowstone on the east, and Clarkes Fork of the Columbia River on the west side of the Rocky Mountains. All the tributaries of these three rivers rise in the mountains, and derive their water supply from the melting of snow that has been stored there during the winter and spring months. By having a knowledge of the depth, character, and distribution of the snow that has accumulated during the months of January, February, and March, a reliable general forecast of the water supply for the ensuing season can be made for the different streams of the State. There is one element that enters

into the forecast that can not at present be foreseen, and that is, a knowledge of temperature. This, however, affects the water flow only in the early spring, commonly known as spring freshets, which occur in April, May, or June.

In the mountains of Montana there are hundreds of canyons and ravines where the sun shines but little, if any, during the day. These deep ravines are the storage places of the water supply. This is an example of nature's economical distribution of her supplies for man's use. High winds drift the snow into these storage places to a great depth, where, by its own weight, aided by the changes in temperature, it gradually solidifies, in which condition it loses little from evaporation and yields its moisture but slowly and during a comparatively long period during the later spring and early summer. Drifts are also formed at the bases of precipitous cliffs, which, if located on the northern slope of mountains or hills, remain until May or June before they entirely disappear, and greatly assist in maintaining a steady flow of water in springs and small streams.

Accurate knowledge of the depth of snow in the valleys and foothills, in the mountains both above and below the timber line, in ravines, deep canyons, and at the bases of cliffs and precipitous bluffs are all essential in making an accurate forecast of the amount of water in streams during the spring and summer months.

The volume of water in the mountain streams and creeks during the spring freshets that come with the first warm weather of April or May, depends on the depth of snow in the valleys and the foothills. The high water in the larger rivers, occurring during the first protracted warm weather in May or June, is determined by the depth of accumulated snow in the mountains both above and below the timber line. The drifts in the ravines and canyons remain to furnish the steady flow to the streams during the summer months. The temperature and weather are important factors in the spring freshets and floods. Continued warm weather and warm rains greatly augment the flood stages, while warm weather followed by a sudden fall in temperature will greatly lessen the chances of floods, as the slush snow, being frozen, melts more slowly afterwards.

At the beginning of the year 1900 the Montana section of the climate and crop service published, by direction of the Chief of the Weather Bureau, three special snow bulletins, dated January 31, February 28, and March 31. These special bulletins were made up of reports received from 294 correspondents situated in every portion of the State. The greater number of correspondents, however, were in the mountain districts, and gave very valuable information as to the depth of snow in drifts, ravines, and in the mountains both below and above the timber line. These three bulletins each told the same story: "The least snowfall in the mountains that has occurred for many years past." Drifts were of unusually small dimensions, and in many ravines, where snow in former years accumulated to a depth of from 20 to 50 feet, this year there was practically none. The lack of drifts was due to calm weather, there having been no high winds immediately following snow storms. The hills were practically bare and cattle grazed in the valleys all winter. The mild weather during the winter months, aided by chinook winds, caused the south side of the mountains to be free from snow, while many mountain streams were bank full during the winter months. The correspondent at Ovando, situated on the main range of the Rocky Mountains in Deer Lodge County, under date of April 5, 1900, writes:

> All ravines running north and south on the southern side of the mountains are almost bare of snow up to the timber line. These same canyons were covered with snow during 1899 until July 1. There is less snow on the ground now than at this season in any year during the past ten.

The snow bulletins were of great importance to the mining, stock, and agricultural interests; and all interested persons were informed that the water supply in the streams would be greatly reduced and that no spring floods would occur. The deficiency of the water supply in the streams of the State was made very apparent by the facts contained in the snow bulletins.

On April 17 the first issue of the weekly climate and crop bulletin for the growing season of 1900 appeared. Reports in the crop bulletin dated May 15 contain several references to the water supply, this being the usual time for high water to occur. Reports received from Dawson County stated that many small streams were drying up. Reports from Deer Lodge County stated that creeks were very low for that season of the year, while Gallatin correspondents reported West Gallatin River, bank full from the effect of the rapid melting of the snow in the mountains. Streams in the Bitter Root Valley were bank full, while Kootenai and Red Rock rivers were quite low. Every crop bulletin issued after the above date (May 15) contained reports from different localities that springs and streams were drying up and that rivers were very low.

No river in the State overflowed its banks from the melting of snow during the first warm weather periods, and in June all the snow had disappeared from the mountains except a very few small drifts in the deep ravines and canyons. As a result of the deficiency of storage snow, as shown by the snow bulletins, springs became dry that had never been dry before, and the water supply of small streams failed, compelling cattle to travel long distances for water. Many farmers were deprived of water for irrigation purposes, the entire supply of many streams being exhausted by water rights owned by ranchmen living near the head waters. During ordinary years the flow of water had been sufficient for both.

The meteorological conditions during the time covered by the snow bulletins and weekly crop bulletins show the highest mean temperature on record for January and March and an excess of temperature for January, March, April, May, and June, and a deficiency during February, August, and September. The precipitation was deficient for January, February, June, and July, while an excess is recorded for March, April, May, August, and September. The greatest departures from the normal precipitation were a deficiency of 1.89 inches for June and an excess of 1.15 inches for April. The rainy season occurred in April of this year, instead of the latter part of May or in June, as it commonly does.

The importance of having accurate reports of the depth of snow on the mountains is very emphatic, as the observations taken by voluntary observers in the valleys do not give *all* the facts necessary for the intelligent preparation of a seasonal forecast of the water supply for a given section.

NEW MEXICO.

By R. M. HARDINGE, Section Director.

The snowfall bulletin issued from the New Mexico section center at Santa Fe on the 3rd of March stated:

> The total snowfall thus far for the winter was much less than usual. There is an absence of the large drifts from which comes the greater part of the spring flow. At the headwaters of the Rio Grande and San Juan rivers, in southwestern Colorado, there seems to be about the average amount of snow, but from their New Mexico tributaries these streams will receive very little increase unless conditions change. Of the streams whose watersheds lie wholly within New Mexico it is safe to say that the present snow supply is not enough to keep up the current flow, and unless there is heavy snow soon or good early rains the sections depending on these are threatened with a serious water famine in the early spring.

The 1st of April found little water in the streams, excepting the Rio Grande, and there was no prospects for a continu-

ous supply from the mountain sources. General storms on the 6th, 7th, and 8th of April, bringing rain and snow to the lowlands, and a good fall of snow on the mountains of Colorado and northern New Mexico, entirely changed the water prospect, especially for our local streams. A second snowfall bulletin, issued on April 13, gave the information that, although the snow of these storms quickly disappeared from the lowlands, it had helped the streams, and predicted that in connection with the steady supply that could now be expected from the mountain sources a fair supply of water in the streams was practically assured for some time to come. In conclusion this bulletin stated:

> As there is an absence of the usual hard-packed drifts in the mountains, there is a likelihood of this source of supply being exhausted in a few weeks, but if augmented by the normal precipitation of this season of the year it is thought that the water flow will be fairly sufficient until the summer rains begin.

This forecast was verified, as there was no scarcity of water in those sections which received a seasonal and normal rainfall.

As a rule the water supply of the streams in the Territory was sufficient for the lands under ditch during the growing season, with the exception of the lower Rio Grande, and lands in the northern counties of Taos and Rio Arriba, which depended on small local streams. Approximately the upper half of the Rio Grande had normal volume beginning early in March, but the flood water rapidly diminished from Socorro southward, because of use and seepage, and did not arrive at the southern boundary of the Territory until the middle of May. From that time on there was a fair supply of water in the Rio Grande throughout its course in New Mexico.

The San Juan River, running to the westward through the extreme northwestern part of the Territory, and drawing its supply almost exclusively from the mountains of southwestern Colorado, furnished sufficient irrigation water throughout the season, although there was almost a total absence of the usual summer rains over that part of its watershed lying in New Mexico.

The Gila and San Francisco rivers, draining the southwestern counties and, like the San Juan, carrying their waters westward of the Continental Divide and through Arizona, had less than their usual flow during the greater part of the season. As a rule, however, they carried sufficient water for the ditches lying in New Mexico.

Over the western half of the Territory, affecting the sources of the Gila and San Francisco rivers and so much of the watersheds of the San Juan and Rio Grande as lie within New Mexico, there was a marked deficiency in the usual winter, spring, and summer precipitation. Even the normally rainy months of July and August were wholly lacking in general showers. The crops of this section which depend on direct rainfall for moisture were almost total failures, and the ranges were so dry that stockmen generally made arrangements to move the flocks and herds to eastern plains. Notwithstanding this disastrous drought in the lower valleys and plains, there were frequent thunderstorms in the vicinity, but their limits were confined to the highest mountain peaks; yet the water furnished from that source was sufficient to supply the irrigated districts fairly well throughout the drought. Ordinarily the rainy season is drawing to a close by the end of August, but this year during the first decade of September there occurred general and heavy rains—torrential and damaging in localities—and the drought conditions for this section were entirely relieved for the remainder of the season.

Over the eastern half of the Territory, embracing the watersheds of the Pecos and the upper Canadian rivers, the conditions were quite different. This whole section, especially in the northeast during the earlier months and the southeast during the later, received a surplus of precipitation almost as marked as was the deficiency in the west. Excepting some local and minor streams of the middle east, these rivers had an abundant flow throughout the season.

UTAH.

By L. H. MURDOCH, Section Director.

In mountainous countries where irrigation is practised and in sections where fall grain is raised, in the temperate zone of the Northern Hemisphere, a study of the water supply from September to August, inclusive, is undoubtedly most instructive. With the exception of a few minor products the crops of a season are matured by the close of August. The rains of September place the fields in condition to be worked and to germinate fall sown grain. In irrigation districts the growth and maturing of the crop of the following season will depend almost entirely upon the supply of water that is received from the snow accumulated in the mountains from October to April. For the foregoing reasons the year used in this article will be from September to August, inclusive.

Precipitation of the year 1899–1900.—September was the driest since the establishment of the Utah section of the climate and crop service in 1891. The average precipitation for the State was only 0.05 inch, or 0.78 inch below the normal. The precipitation was all in the form of rain. The normal snowfall for September is 0.4 inch.

October was unusually wet, the average precipitation being 1.46 inches, or 0.59 inch above the normal. The average depth of snowfall was 3.2 inches, or 1.9 inches above the normal.

The average precipitation for November was 0.70 inch, or 0.13 inch below the normal. The snowfall was unusually light and was confined exclusively to the mountains; the average was only 0.6 inch, or 4.8 inches below the normal.

The average precipitation for December was 0.95 inch, or 0.04 inch below the normal. The snowfall amounted to 8.2 inches, which was 4.5 inches above the normal.

The Utah records do not show a drier January than that for 1900. The average precipitation was 0.43 inch, or 0.73 inch below the normal. The average snowfall was 2.1 inches, or 8.6 inches below the normal.

February was also a very dry month. The average precipitation was 0.57 inch, or 0.65 inch below the normal. The average snowfall was 5.1 inches, or 4.4 inches below the normal.

Following the directions of the Chief of the United States Weather Bureau, a snowfall bulletin was published, beginning with the month of February. This bulletin gives the depth of snow on the ground, depth on mountains or hills, compares depth with that of same month of preceding year and with the average, and gives the prospective water supply. The following is the summary of the February bulletin:

> At the close of February there was no snow in the valleys except in Summit, Rich, and portions of Cache, Morgan, and Wasatch counties. The winter's snowfall has been very much below the average—less than for a number of years. Most of the snow in the mountains and hills fell during February, and is not packed as it would be had it fallen earlier in the season. On an average the snowfall in the mountains is only about half that of last year, and less than three-fourths of the usual amount. With the exception of localities in Boxelder, Cache, Rich, Weber, and Davis counties, the prospective water supply is far below the average.

March was the driest on record and probably the driest in the history of the State. The average precipitation was 0.19 inch, or 1.41 inches below the normal. The average snowfall was 1.2 inches, or 8.2 inches below the normal. The following is the summary of the snowfall bulletin issued for March:

The snowfall during March was confined to Cache, Rich, Weber, Morgan, Davis, Salt Lake, Summit, Tooele, Sanpete, Sevier, Wayne, and Garfield counties. In these counties the fall was unusually light, ranging from less than an inch to four inches, with the exception of 12 inches in Piute County. Nearly all of the snow which fell came with the storm of March 4 and 5, and disappeared from the valleys within a few hours. The month was unusually warm, as well as unusually dry, which caused rapid melting of the already scant supply of snow in the mountains. At the close of March the depth of snow in the mountains was not more than one-half the average amount. Many reporters state that the past winter was the driest they have ever known. The water supply will be very short, and many localities will have to depend largely upon spring and summer rains to carry the crops through to maturity.

The precipitation for April amounted to 2.46 inches, or 1.51 inches above the normal. The average snowfall was 7.1 inches, or 3.9 inches above the normal.

A drought began with May and lasted the remainder of the season. The average precipitation for May was 0.36 inch, or 0.84 inch below the normal; for June, 0.16 inch, or 0.27 inch below normal; for July, 0.09 inch, or 0.56 inch below normal, and for August, 0.34 inch, or 0.31 inch below normal. The normal snowfall for May is 1.7 inches, but practically no snow fell after April.

Summary and comparisons.—The average precipitation for the State for the year ending August 31, 1900, was 7.76 inches, or 3.62 inches below the normal. The average snowfall was 27.5 inches, or 17.8 inches below the normal. It was the driest year since 1888–89, the precipitation for the years 1887–88, 1888–89, and 1899–1900 being about the same. The accumulated snow in the mountains at the opening of the summer was less than the season's fall in the valleys would indicate, for two reasons. Firstly, in an ordinary season frequent snowstorms occur in the mountains that do not reach the valleys, while during the season of 1899–1900 there was nearly an entire absence of local snowstorms in the mountains. Secondly, the season was exceptionally warm, which allowed much melting.

Results.—The heavy rainfall of April gave the crops a good start and made the use of irrigation water unnecessary at that time. As shown by the record, an unusually dry spell began with May and lasted the remainder of the season. As predicted in the snowfall bulletin for March, irrigation water was very short and had to be used with the utmost economy. By the middle of June, with the exception of a few localities, the supply began to fail and was not sufficient to meet the demands. Some of the higher lands, which had been watered in former seasons, received no water at all. Water was used for the most important crops, while the less important and most hardy ones were allowed to depend largely upon the rainfall. As a result of this, several crops gave yields more or less below the average. The localities having plenty of water throughout the season were those supplied from reservoirs and about 20,000 acres in Boxelder County supplied from the Bear River Canal.

Old residents on the Colorado, Bear, and Provo rivers state that these rivers were lower during August and September of 1900 than ever known before. The other rivers and streams of the State were very low at the same time, and many of them reached low water mark.

In Salt Lake City great economy was exercised in the use of water from the pipes. The supply began to fail in July, and during August and September the shortage amounted to 3,000,000 gallons per day. On account of this emergency the city sold $250,000 of bonds to secure money with which to deepen the Utah Lake Canal, buy new water rights and make other improvements in the waterworks department.

The level of Utah Lake dropped to 3 inches above what is known as low water line, but the level in October of 1889 was about 13 inches lower. The level of Great Lake dropped to 8 inches below the zero of the gage, breaking the record by 20 inches, the previous lowest recorded level, 1 foot, was reached near the close of 1860.

Snowfall bulletins of the Weather Bureau.—The past season has emphasized the value of the snowfall bulletins, and they will, hereafter, be one of the most popular publications of the Weather Bureau. The data contained in the bulletin for March, showed plainly that there would be a decided shortage in the water supply, notwithstanding the fact that no similar data were on file for use in making comparisons. The bulletins will be published for the months of December, January, February, and March. Their value will increase with the accumulation of the data which they contain, and farmers, stockmen, superintendents of waterworks, officials of canal companies, etc., will study them closely and regulate their affairs accordingly.

WYOMING.

By W. S. PALMER, Section Director.

The past season in Wyoming was unusually dry over many sections of the State, especially over the southwestern and northeastern counties; in southeastern Wyoming, that is, in Laramie and Albany counties, the deficiency in precipitation was not so marked as over the sections previously named, and the streams of the Laramie and Platte watershed in southeastern Wyoming maintained their flow much later than the streams of the Green River watershed in southwestern Wyoming or the streams on the eastern slope of the Big Horn Mountains in northeastern Wyoming. As many of the streams of the State are fed by the melting snow from the mountains, a review of the conditions existing over the State during last winter is necessary in order to fully understand why so many streams failed in the early summer.

The following table, compiled from the records of about thirty stations in Wyoming, shows the average monthly precipitation for each month from November to August, inclusive:

Month and year.	Average precipitation.	Departure.	Month and year.	Average precipitation.	Departure.
November, 1899	0.13	−0.56	April, 1900	4.46	+2.68
December, 1899	0.69	+0.02	May, 1900	0.50	−1.29
January, 1900	0.23	−0.46	June, 1900	0.47	−1.07
February, 1900	0.90	+0.14	July, 1900	1.22	+0.07
March 1900	0.44	−0.97	August, 1900	0.37	−0.45

The stations from which these records were obtained are situated at elevations ranging from 3,500 feet to 8,800 feet, and while the figures may not represent the actual average precipitation in the mountains, the monthly departures will give some idea as to whether an excess or a deficiency of precipitation occurred over the mountain districts, as the records available for comparison show that a deficient precipitation at the lower elevations means a deficient snowfall on the mountains. It can be seen from the table that the months of November, January, and March gave decided deficiencies, and the months of December and February but slight excesses. During five months from November to March, inclusive, the months during which the stock of snow in the mountains usually accumulates and packs solid for the water supply of late summer, Wyoming received an accumulated precipitation of but 2.39 inches, or only about one-half of the usual precipitation, the normal for the five months being 4.32 inches.

The precipitation during April was unusually heavy over nearly all portions of the State, but the snow which fell in the mountains melted very early in the season. Snow which

falls in the mountains during April or May can not be depended on to supply water for late summer irrigation, and the stock of snow which fell in the mountains last April melted very early in the summer, due to the usually warm weather of May and June, the temperature for the two months in the State averaging from 4° to 6° per day above the normal.

The precipitation during May, June, and August, was very deficient throughout the State, and during July it was but slightly in excess of the normal. Of the ten months, six were decidedly deficient in precipitation, three months but slightly in excess of the normal, and but one month, April, had a decided excess.

It might be remarked in this connection that the season in Wyoming was a fairly successful one to the agriculturist, as the heavy precipitation of April was especially favorable to the meadows of the State, and despite the adverse conditions of May and June, a crop of hay probably in excess of the average was harvested; it may be safely said that the value of the hay crop, native and alfalfa, exceeds that of all other agricultural and garden products raised in this State at present.

At the close of the months of January, February, and March, 1900, special snowfall bulletins, based on reports of reliable correspondents in various portions of the State, were issued from the Weather Bureau office at Cheyenne. These bulletins showed that much less snow than usual had accumulated in the mountains in nearly all portions of the State. In the report issued about the 10th of April it was predicted that a flow of water less than the usual would prevail in the streams of the State during the summer. Owing to the very small stock of snow in the Big Horn Mountains, it was predicted that a decided shortage of water would occur in the streams on the eastern slope of the Big Horn Mountains; this prediction was fully verified, for by the last of June water was very low at Sheridan, and only the early appropriators could secure water for irrigation; by July 6 low water was reached at Parkman, Sheridan County; on August 15 the Powder River at Griggs was the lowest it had been for years. Owing to the light snowfall of the winter and continued dry weather in early summer, the streams of the Green River watershed dried up very early in summer. Over the Laramie and Platte watershed, where a fair stock of snow existed at the close of March, as shown by the snowfall bulletin for that month, the flow of water in the streams was maintained much later than in other sections, although the amount of water was less than usual in nearly all the streams of the State. The gaging station, maintained by the United States Geological Survey, at Woods on the Laramie, a station above nearly all of the ditches on that stream, showed that high water was reached as early as May 30, 1900, while during 1899 high water was not reached till June 25; the flow of water at that station in August, 1900, was much less than the flow in September, 1899.

The interest and value of these monthly snowfall bulletins has been such that the Chief of Bureau has authorized their issue for Wyoming during the coming winter, when it is hoped to make them of even more interest and value than during the past winter. It is expected that special snowfall bulletins for Wyoming will be issued at the close of the months of December, January, February, and March.

TORNADOES IN TENNESSEE, MISSISSIPPI, AND ARKANSAS.

By S. C. EMERY, Local Forecast Official, dated November 20, 1900.

During the afternoon and evening of November 20, 1900, the section of country embracing southeastern Arkansas, northern Mississippi, and western Tennessee was visited by at least six distinct tornadoes, all of which were destructive and exhibited the usual characteristics of such storms. All moved in exactly the same direction in parallel lines, with a rate of progressive motion of from 45 to 60 miles an hour, as shown in fig. 3.

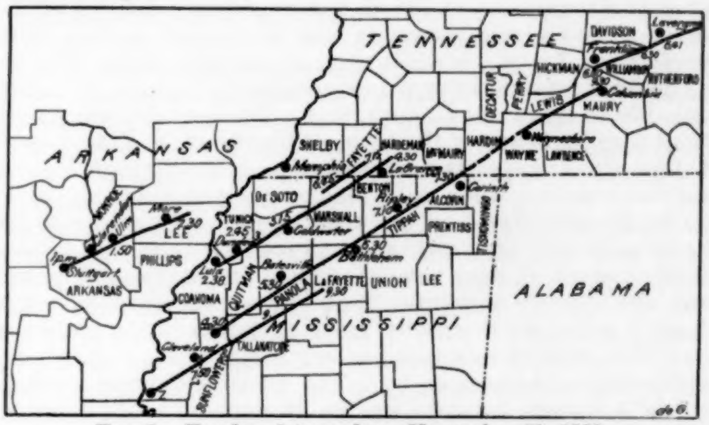

FIG. 3.—Tracks of tornadoes, November 20, 1900.

Some portions of the country through which the tornadoes moved are thickly settled, and as everything within the limits of their narrow paths was destroyed, the loss of life and property was very severe. The actual deaths resulting from these storms number at least seventy-three, while a large number of persons were seriously injured and a much greater number rendered homeless by the destruction of their dwellings. Through the farming districts the loss was mainly confined to fences, farm buildings, and negro cabins, a great number of the latter being carried completely away. Unpicked cotton was stripped from the stalk and scattered broadcast over the country, and instances were noted where large quantities of cotton were carried by the tornado to distant forests and deposited upon trees making them appear to be covered with snow.

Correspondents along the tracks of the storms report a funnel-shaped cloud; some liken its appearance to a balloon, others to a haystack, while some speak of it as a very black or greenish cloud with a small twisting end touching the earth. In some places the cloud appeared as a great ball of fire, and at others small balls of fire shot out of the lower portion of the cloud. The most notable feature, and the one mentioned by all who observed the storms, was the intense and constant lightning, the extreme brilliancy of which in some cases turned night into day. The noise attending the passage of the storm cloud is generally described as a deep roar like the moving of many railway trains, which could be heard for some time before the storm arrived. The warning thus given enabled many to seek places of greater safety and was the means of saving life. Hail is reported in only one or two instances. Generally, after the tornado had passed, heavy rain set in which continued for some time.

One fact worthy of note is that through the low, timbered sections the path of destruction was much narrower than over the high ground, though in both cases there appears to have been nothing in the way of buildings or trees sufficient to resist the wind. The weather conditions during the morning of November 20, throughout the section affected, were exceedingly threatening. Temperature was abnormally high for the season, air close and sultry, and for several hours a general feeling of oppression prevailed. Frequent showers of short duration occurred, usually accompanied by thunder and sudden gusts of wind. Heavy rain would start in and continue for five minutes or less, and then end as abruptly as it began. Wind fresh from south and southwest until about noon, when it died down to nearly a calm. The barometer at Memphis, Tenn., rose slightly during the morning, but

about noon a rapid fall set in which continued until 3 p. m.; this was followed by a sharp rise, and this again by a quick turn downward until about 7 p. m. The temperature rose steadily from 8 p. m. of the 19th to 9 a. m. of the 20th. At 10 a. m. of the 20th the temperature fell 5° and then rose rapidly again to a maximum of 74° at 2 p. m., when a fall of 10° occurred within a few moments and continued to fall more slowly until 7 p. m., when it reached the minimum, 63°.

The first tornado reported originated in eastern Arkansas, probably in Arkansas County, and moving northeast, passed about 5 miles south of the town of Stuttgart, in that county, at 1 p. m. It kept its northeasterly course through Monroe and Lee counties, when upon reaching a high ridge bordering the St. Francis Basin on the west, known as Crowleys Ridge, the tornado left the earth and was seen no more. It is possible, however, it may have continued its course and passed over the City of Memphis, Tenn., at a considerable height about 3 p. m., as there was great agitation in the clouds at that time and the meteorological instruments indicated a serious disturbance near by. The greatest damage wrought by the Arkansas tornado was in Monroe and Lee counties. Its path throughout was strewn with wrecked houses and other buildings, but fortunately the list of fatalities is small. About 6 miles north of Stuttgart, near Ulm, Ark., several dwellings were destroyed and 2 persons killed. The town of Moro, in Lee County, 14 miles northwest, was almost entirely swept away, only 4 buildings left standing; 1 white child was killed and its mother seriously injured; 2 negroes were also killed. Total number killed in Arkansas, 6. The tornado traveled 45 miles in one hour and fifteen minutes.

Tornado No. 2 started in the vicinity of Moon Lake, in Coahoma County, Miss., and passed near the town of Lulu, Miss., about 2.30 p. m., and through Dundee, Miss., at 2:45 p. m. From Dundee the tornado took a northeast course and passing through the counties of Tunica, Tate, Marshall, and the northwest corner of Benton, reaching the Tennessee line not far from Michigan City. It then passed through a portion of Lagrange, Tenn., and disappeared from view.

The destructive character of this storm was first felt near the town of Dundee, Miss., on the farm of Mr. F. M. Norfleet, of this place. On this farm 6 persons were killed, many buildings destroyed, great damage done to fences and unpicked cotton. From Dundee to Arkabulta, Miss., the storm track was marked by wrecked buildings, fallen trees, and general desolation; 8 white persons and 1 negro were killed. Arkadelphia, Miss., is a town of about 1,000 inhabitants and scarcely one of them escaped injury. Hundreds of homes were swept away without warning, and 11 persons were killed and a very large number severely injured. Continuing its northeasterly course the tornado reached Strayhorn, Miss., at about 3 p. m., killing 11 people, and Coldwater, Miss., at 3.15 p. m., where 1 person was killed and much valuable property destroyed. The next town visited was Guys Switch, a small settlement about 1 mile south of Love Station, in Tate County, reaching that place at 3:20 p. m., and demolishing 10 or 12 buildings, among which was the big sawmill plant of J. Guy & Co. Mr. Guy reports as follows regarding the storm at his place:

> We were running a sawmill at the time and did not notice the approach of the storm until within a few yards of us. The destructive part of the storm lasted about five or ten minutes. There were 23 men in the mill at the time, and though it was completely demolished no one was hurt. The storm was moving northeast with a path, I think, about 500 yards wide. It passed my place and swept everything before it. There was no hail, very little thunder and lightning, and no rain until the storm had passed. The trees outside of the storm's path lay mostly with their tops toward the center of the track of greatest destruction. The cloud was funnel shaped, and when it came in contact with the ground flattened out, and as it rose became narrower. One man was killed and several badly hurt by flying and falling lumber.

From the accompanying diagram it would appear that the tornado at Guys Switch either divided and the two parts traveled in nearly parallel lines for a mile or two and then became united, or else the zig zag motion noted at many places was unusually pronounced in this case, and it bounded over the uninjured buildings. I am inclined to believe the latter explanation the more reasonable.

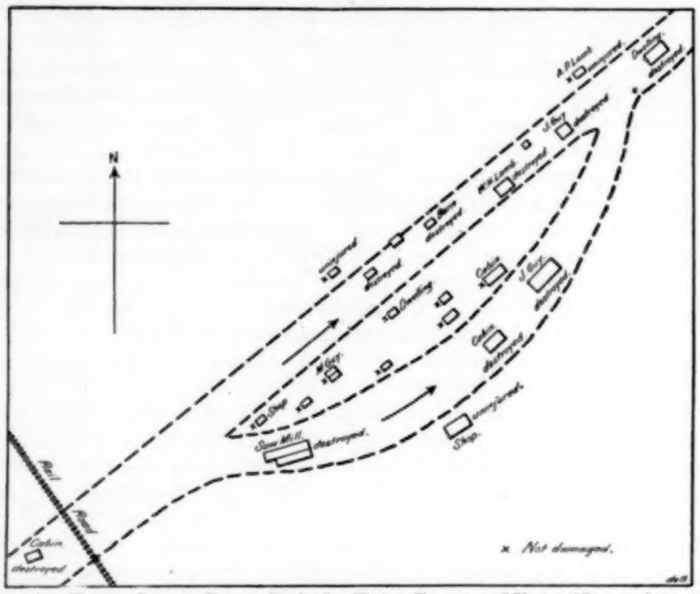

FIG. 4.—Tornado at Guys Switch, Tate County, Miss., November 20, 1900, at 3:20 p. m.

The next important town visited by this tornado was Lagrange, Tenn., where it arrived at 4:30 p. m. and destroyed about 20 buildings and caused the death of 2 persons. The property loss at this place aggregates $50,000. Within a path 175 yards wide practically every building was leveled to the ground. After leaving Lagrange the tornado traveled but a short distance and then disappeared. Total distance traveled by the tornado from Dundee to Lagrange, 80 miles; time, one hour and fifty minutes, an average rate of movement of about 60 miles an hour.

Mr. W. E. Darby, of Lagrange, Tenn., furnishes the following in regard to the tornado as he observed it.

> Destruction began 4:30 p. m. and ended five minutes later. Destructive period at any one point was not over thirty seconds. Storm moved northeast by east. Width of path of greatest destruction, 175 yards. Thunder and lightning severe. Cloud was funnel-shaped, and from appearance of débris, etc., the whirl must have been from left to right. Buildings destroyed, 20 in all, mostly frame. Appearance of storm, greenish looking cloud in the southwest, with black cloud, gray below, in the west; both seemed to be approaching us in advance of the storm, sharp lightning in each. Wind light from the east. Occasional light showers preceded the storm and continued up to the time of its arrival. Just before the storm broke there was nearly a perfect calm and a deathly stillness prevailed for several minutes. This was followed by a deep roar like the muffled sound of heavy rain falling on a distant tin roof, increasing to a roar such as might be produced by a thousand railway trains. When the roar was first heard the green and black clouds had disappeared, and the southwest sky became a heavy leaden gray, with the appearance of heavy rain falling. This seemed to melt away like vapor, or to be drawn aside as a curtain, while from beneath and beyond there came bounding and leaping into sight like a thing of life, the tornado cloud. Black as night, edged with white, all motion and confusion. It looked much like the dense smoke just breaking through the roof of a burning building. It came on very rapidly, increasing in size, and filling the air with flying débris. No hail; gradual fall in temperature after the storm, but not over 10° in all. Immediately after the storm rain fell in torrents for about an hour. Observed all this from the street directly in the track of the storm and only saved myself by running.

A strange relic left by the storm at Lagrange was a tin sign bearing the inscription "Johnson Bros., Lula, Miss." evidently brought by the tornado from that place more than 80 miles distant. From a frame house on Main street was extracted a small piece of rotten wood which was driven half through

a heavy oak plank, despite the fact that the flying splinter was so decayed that it crumbled while being drawn out. The Methodist church was destroyed in an even more singular manner. Each of the four walls fell inward, forming a succession of layers, one on top of the other, and all surmounted by the steeple. The cyclone wind, after the roof had been taken away, evidently formed a vacuum inside the church, which resulted in all the walls closing in.

Tornado No. 3 started about 25 miles south of No. 2 in the northern portion of Sunflower County, Miss., passing 6 miles south of the town of Sumner, Tallahatchie County, at about 4:30 p. m.; moved northeast through the counties of Tallahatchie, Panola, Lafayette, touching the southern portion of Marshall and Benton, through Tippah and Alcorn, and passing into Tennessee just north of Corinth. In its movement northeastward from Sunflower County, the storm passed near Batesville at 5:30 p. m., doing only slight damage. From there it seems to have touched the earth only occasionally, passing over Abbeville, and striking the earth again near the town of Bethlehem in Marshall County at 6:30 p. m., where it destroyed 3 buildings, and passed on to Tacaleeche, Benton County, wrecking two or three small dwellings about 6:45 p. m. It reached Ripley, Tippah County, at 7:10 p. m. Its track at this place was about 200 yards wide, and within 7 miles of town at least 25 dwellings were destroyed and a large number of people injured, but none are reported killed. From Ripley the storm passed through a fine farming district destroying many dwellings and other property. The next point of attack was Corinth, Alcorn County, where it arrived at 7:30 p. m., but as it passed to the south of the town no fatalities occurred, and the damage was mostly confined to negro cabins, many being blown away. The distance from the point of starting to Corinth is about 125 miles; time, three hours and thirty minutes.

After entering Tennessee the storm's track was through a section of country from which it is difficult to obtain even meager information, but it is known to have continued its course to the northeast, and entering the southeastern portion of Maury County, reached Columbia two hours after leaving Mississippi, or at 9:30 p. m. The tornado passed through the suburbs of Columbia in a northeasterly direction, sweeping a path from 100 to 300 yards wide and destroying everything within its reach; 27 persons were killed and between 60 and 70 more or less injured. About 50 dwellings were destroyed, and the loss in buildings alone is estimated at $30,000. A settlement near Columbia, known as Macedonia, about 2 miles from the original striking point of the tornado, containing about 25 houses, was completely demolished, and 13 people were buried under the débris. After leaving Columbia the tornado cloud disappeared. Total distance traveled, 215 miles; time, five hours and thirty minutes.

Tornado No. 4 started about 6 p. m. in Williamson County, Tenn., a few miles south of Franklin; it passed through the town of Clovercroft, and struck Nolandsville at 6:30 p. m., where 3 persons were killed and about 13 buildings destroyed. Passed through Lavergne, in the southeast corner of Davidson County, at 6:41 p. m., killing 2 persons and demolishing 25 buildings. As I have not been able to trace this storm beyond Lavergne it is probable it left the earth at that point. Distance traveled, about 25 miles.

Tornado No. 5 probably had its origin in the extreme southeastern portion of Arkansas, but first came into notice not far from the town of Huntington, Bolivar County, Miss., at 7 p. m. In the vicinity of Huntington 10 buildings were destroyed and about 20 persons injured. From Huntington the storm moved northeast and reached Cleveland in the same county at 7:50 p. m., wrecking a number of houses on the Sparkman and Coleman plantations, and injuring a number of people. From Cleveland the storm passed through Sunflower and Tallahatchie counties, a few miles south of the path taken by No. 3, and disappeared near the town of Reynolds in the southeastern corner of Panola County, Miss., at 9:30 p. m. Distance traveled, 95 miles; time, two hours and thirty minutes, or about 40 miles an hour.

Tornado No. 6 started in Marshall County near the town of Coyce, and, moving northeast, struck the town of Tracy, completely demolishing the two-story residence of Mr. J. B. Higgins, sweeping it entirely away, also the brick office of Dr. Berkley, as well as the frame store of Mr. Walker. Leaving Tracy it next visited the little town of Vance, located in the northern edge of Marshall County, where a general store and 10 cabins were destroyed and 3 children killed. The tornado then passed into Tennessee, and reached Moscow, Fayette County, at 7:15 p. m. Here it destroyed the residence of Mr. J. Owens, seriously injuring the inmates, and also demolished several farm houses in the vicinity. This storm was distinctly seen at Collierville, Tenn., and also from Memphis. Distance traveled, 24 miles; time, about 30 minutes.

Besides the tornadoes above noted, two occurred in northern Alabama, one between 6 and 7 p. m., and the other during the early morning of November 21.

The money value of the property destroyed by these tornadoes can not be accurately known, but it is certainly not less than half a million dollars.

THE WEATHER OF THE MONTH.

By Alfred J. Henry, Professor of Meteorology.

CHARACTERISTICS OF THE WEATHER FOR NOVEMBER.

The weather of November, 1900, was rather stormy, in marked contrast to that of October, 1900. The area of high pressure over the eastern seaboard, which has been so marked a feature in the pressure distribution of the last four months, gave way early in the month and areas of high pressure began again to move in a southeasterly direction.

The temperature was generally above normal, except in the upper Mississippi Valley and in the extreme northwest, where the average daily negative departure was from 3° to 6°. Heavy snows occurred in the northern Rocky Mountain districts during the 20th and 21st, but the snowfall elsewhere was comparatively light.

A series of tornadoes occurred in southeastern Arkansas, northern Mississippi, and western and middle Tennessee on the 20th, a special report of which appears elsewhere in this Review.

The distinguishing characteristics of the month were (1) the breaking up of the area of high pressure over the eastern seaboard, (2) a movement of the highs southeastward, and (3) the occurrence of severe tornadoes in the middle Mississippi Valley.

PRESSURE.

The distribution of monthly mean pressure is graphically shown on Chart IV, and the numerical values are given in Tables I and X.

As compared with the preceding month the monthly mean pressure was higher from the eastern Gulf States westward and northwestward over the entire Mississippi Valley and thence westward to the Pacific coast. The region of greatest increase was in the upper Missouri Valley, the Dakotas, and thence northward as far as the field of observation extends. Over this area pressure was from .25 to .30 inch higher than during the preceding month. From the eastern Gulf States northeastward to the Canadian Maritime Provinces, pressure was about one-tenth of an inch lower than during the preceding month. Pressure was below the normal for the season on the Pacific coast, and also over the Middle Atlantic States and New England; elsewhere it was above the seasonal average.

TEMPERATURE OF THE AIR.

The distribution of monthly mean surface temperature, as deduced from the records of about 1,000 stations, is shown on Chart VI.

As in the preceding month temperature was above the normal for the season over the greater part of the field of observation, the only marked exception being in the upper Missouri and upper Mississippi valleys, and thence westward along the northern boundary to the Pacific where the daily mean temperature averaged as much as 6° below the seasonal normal. There were no marked cold waves during the month, except in the extreme northwest and in the northern Rocky Mountain districts. Temperatures below freezing did not occur on the immediate Gulf coast nor on the Atlantic coast, except from southern New Jersey northward. Freezing temperatures were recorded in the interior of the country, except in Florida and along the coasts as above indicated. The lowest minimum temperature registered at any of the regular observing stations was 32° below zero at Medicine Hat.

The average temperature for the several geographic districts and the departures from normal values are shown in the following table:

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	10	42.8	+ 2.6	+15.3	+ 1.4
Middle Atlantic	12	49.0	+ 4.3	+23.2	+ 2.1
South Atlantic	10	57.8	+ 3.0	+12.6	+ 1.1
Florida Peninsula	7	67.3	+ 0.5	+ 0.9	+ 0.1
East Gulf	7	59.8	+ 2.5	+ 4.9	+ 0.4
West Gulf	7	59.7	+ 3.2	+13.9	+ 1.3
Ohio Valley and Tennessee	12	47.0	+ 2.0	+18.7	+ 1.8
Lower Lake	8	41.2	+ 2.2	+17.8	+ 1.6
Upper Lake	9	33.6	+ 0.2	+23.2	+ 2.1
North Dakota	8	21.3	− 3.6	+36.6	+ 3.3
Upper Mississippi Valley	11	38.0	+ 0.6	+24.1	+ 2.2
Missouri Valley	10	37.0	+ 0.2	+30.2	+ 2.7
Northern Slope	7	31.8	− 0.5	+32.6	+ 3.0
Middle Slope	6	43.4	+ 1.9	+24.3	+ 2.2
Southern Slope	6	51.4	+ 2.5	+12.0	+ 1.1
Southern Plateau	15	49.6	+ 2.9	+ 7.2	+ 0.7
Middle Plateau	9	40 5	+ 3.8	+17.4	+ 1.6
Northern Plateau	10	34.9	− 1.2	+20.3	+ 1.8
North Pacific	9	44.7	− 0.7	−10.6	− 1.0
Middle Pacific	5	54.9	+ 1.3	+ 8.3	+ 0.8
South Pacific	4	62.1	+ 4.6	+11.6	+ 1.1

In Canada.—Prof. R. F. Stupart says:

The mean temperature of the month was higher than the average by from 1° to 3° in the more southern portions of Ontario and in Nova Scotia, and about 1° above in nearly all parts of New Brunswick and Quebec. West of Lake Nipissing the departure from average was negative by about 1° near the southern shores of Lakes Huron and Superior, about 2° in Manitoba, and by between 3° and 5° in Assiniboia and British Columbia, and Vancouver Island was very nearly average. One of the most marked features of the month was the exceptionally severe cold which prevailed in the Northwest Territories between the 13th and 25th, during which period the temperature fell below zero at nearly all points on nine days, at some few places on ten or eleven days.

PRECIPITATION.

The distinguishing feature of the precipitation during the month was the heavy fall in California, especially in the southern portion, where severe drought has prevailed for the last three years. Heavy rains also fell in Arizona, and quite generally over the middle and southern plateaus; the rainfall was also above the normal for the season in Tennessee, the Ohio Valley, the lower Lake region, and along the coast of the Carolinas and Virginia.

There was decidedly more snow than during the corresponding month a year ago. The areas of greatest total depth for the month were in the lower Lake region, the St. Lawrence Valley, northern New England, upper Michigan, and the Rocky Mountain districts, especially in Colorado.

The numerical values of rainfall for a large number of stations are given in Table II. At the end of the month snow covered the ground in New England, except along the immediate coast, the greater portion of New York, and the ground was generally covered in northern Iowa, Minnesota, North Dakota, and the upper portions of Wisconsin and Michigan. Snow also covered the ground in the mountainous districts of Colorado, western Wyoming, Idaho, and California.

HAIL.

The following are the dates on which hail fell in the respective States:

Arizona, 18, 19. Arkansas, 23. California, 17, 19, 20. Connecticut, 7, 8. Illinois, 6, 7, 17, 18, 19, 20, 21, 22. Indiana, 8, 16, 21, 22. Indian Territory, 18. Kansas, 10, 23. Kentucky, 8, 22. Louisiana, 24. Maine, 9, 14. Maryland, 7. Massachusetts, 8, 9. Michigan, 5. Mississippi, 19. Missouri, 19, 23. Nevada, 19. New York, 22. Ohio, 20, 21. Oklahoma, 18. Oregon, 1, 17, 18, 19, 20. Tennessee, 21, 23, 24. Virginia, 8, 25. West Virginia, 23.

SLEET.

The following are the dates on which sleet fell in the respective States:

Alabama, 25. Arizona, 20. Arkansas, 9, 10, 11, 24, 25. California, 7, 17, 18, 19, 20, 30. Colorado, 18, 19, 20. Connecticut, 9, 17, 18, 24, 25. Georgia, 13. Idaho, 20, 21, 26, 30. Illinois, 6, 7, 10, 11, 13, 16, 17, 20, 23, 24, 25. Indiana, 5, 7, 8, 10, 14, 16, 17, 18, 20, 23, 24, 25. Indian Territory, 9, 11, 24, 25. Iowa, 1, 5, 6, 10, 12, 14, 16, 17, 18, 19, 20, 22, 23, 24. Kansas, 11, 17, 18, 19, 20, 21, 22, 23, 24. Kentucky, 8, 11, 21, 25, 26. Maine, 20, 25, 26. Massachusetts, 17, 25, 26, 30. Michigan, 5, 7, 8, 18, 19, 20, 21, 22, 24, 25, 28. Minnesota, 5, 8, 16, 17, 18, 19, 20. Mississippi, 10, 24. Missouri, 10, 11, 16, 17, 20, 21, 23, 24, 26, 27. Montana, 16, 30. Nebraska, 10, 11, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25. Nevada, 16, 17, 18, 20, 21. New Jersey, 7, 9, 11, 15, 17, 24, 27. New Mexico, 8, 26. New York, 9, 17, 19, 24, 25, 26, 27, 28, 29, 30. North Carolina, 8. Ohio, 7, 8, 10, 11, 16, 17, 23, 25, 26, 29. Oklahoma, 11, 19, 24. Oregon, 17, 18, 19, 20, 23. Pennsylvania, 17, 21, 24, 25. South Carolina, 12. South Dakota, 17, 18. Tennessee, 8, 10, 11, 25, 26. Texas, 9. Utah, 1, 17, 18, 19, 20, 21, 23, 26, 27. Virginia, 8. Washington, 16, 17, 18, 23. Wisconsin, 16, 17, 18, 19, 20. Wyoming, 17, 18, 20, 22.

Average precipitation and departure from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	10	4.30	108	+0.3	−2.2
Middle Atlantic	12	3.00	97	−0.1	−7.5
South Atlantic	10	3.90	130	+0.9	−7.4
Florida Peninsula	7	0.82	34	−1.6	+1.3
East Gulf	7	3.10	84	−0.6	+9.2
West Gulf	7	2.44	62	−1.5	+2.3
Ohio Valley and Tennessee	12	5.28	147	+1.7	−5.9
Lower Lake	8	4.06	128	+0.9	−1.1
Upper Lake	9	2.50	100	0.0	−2.3
North Dakota	8	0.72	116	+0.1	+2.3
Upper Mississippi Valley	11	1.81	82	−0.4	+0.9
Missouri Valley	10	0.79	61	−0.5	+2.6
Northern Slope	7	0.31	61	−0.2	−1.3
Middle Slope	6	0.52	63	−0.3	+1.2
Southern Slope	6	1.04	91	−0.1	+8.8
Southern Plateau	15	1.47	258	+0.9	−0.3
Middle Plateau	9	1.34	143	+0.4	−2.7
Northern Plateau	10	1.23	75	−0.4	−1.5
North Pacific	9	5.49	75	−1.8	−1.6
Middle Pacific	5	4.77	161	+1.8	−1.2
South Pacific	4	5.14	384	+3.8	−0.5

In Canada.—Professor Stupart says:

In Ontario, Quebec, and the Maritime Provinces the precipitation was in excess of the average and chiefly in the form of rain; there were, however, several falls of snow in all districts, and in the St. Lawrence Valley there was a heavy northeast snowstorm during the 25th and 26th.

In Manitoba, Assiniboia, and southern Alberta the precipitation was almost wholly snow, and varied between 8 and 16 inches; in Saskatchewan and northern Alberta the fall was much less.

On the last days of the month the more southwestern portions of the northwest prairies were bare, but a covering of from 5 to 10 inches was very general in Manitoba and over most of Assiniboia, and as much as 20 inches was reported from Qu'Appelle. The more eastern and northern portions of Ontario reported several inches on the ground, but rapidly disappearing. In Quebec and over the greater portion of New Brunswick a covering was general, but nowhere very deep, 12 inches at Brome, Que., being the deepest reported. In southern and eastern Nova Scotia and in Prince Edward Island the depth ranged between 2 and 4 inches.

HUMIDITY.

The averages by districts appear in the subjoined table:

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	79	+1	Missouri Valley	72	+1
Middle Atlantic	74	−2	Northern Slope	69	+3
South Atlantic	78	−1	Middle Slope	63	+1
Florida Peninsula	77	−4	Southern Slope	65	+4
East Gulf	76	−1	Southern Plateau	40	−6
West Gulf	75	+2	Middle Plateau	59	+5
Ohio Valley and Tennessee	73	0	Northern Plateau	80	+7
Lower Lake	78	+2	North Pacific Coast	86	−1
Upper Lake	83	+3	Middle Pacific Coast	79	+6
North Dakota	81	+2	South Pacific Coast	64	−3
Upper Mississippi	76	+2			

SUNSHINE AND CLOUDINESS.

The distribution of sunshine is graphically shown on Chart VII, and the numerical values of average daylight cloudiness, both for individual stations and by geographical districts, appear in Table I.

The averages for the various districts, with departures from the normal, are shown in the table below:

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	7.0	+1.4	Missouri Valley	5.0	+0.1
Middle Atlantic	6.1	+0.9	Northern Slope	4.9	+0.3
South Atlantic	4.5	0.0	Middle Slope	4.2	+0.6
Florida Peninsula	4.3	−0.3	Southern Slope	2.8	−0.4
East Gulf	4.5	0.0	Southern Plateau	2.6	+0.3
West Gulf	4.4	−0.2	Middle Plateau	4.8	+1.2
Ohio Valley and Tennessee	5.7	0.0	Northern Plateau	6.6	+0.6
Lower Lake	7.9	+0.7	North Pacific Coast	6.5	−0.3
Upper Lake	7.7	+0.7	Middle Pacific Coast	6.0	+2.2
North Dakota	5.0	−0.3	South Pacific Coast	4.2	+0.3
Upper Mississippi	5.6	+0.3			

WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Amarillo, Tex	20	52	nw.	Cleveland, Ohio	25	54	n.
Do	24	56	n.	Do	26	61	n.
Block Island, R. I	9	71	w.	Hatteras, N. C	4	51	n.
Do	10	53	w.	Do	8	53	w.
Do	22	50	w.	Indianapolis, Ind	21	51	s.
Do	26	54	ne.	New York, N. Y	8	50	sw.
Buffalo, N. Y	12	57	w.	Do	9	74	nw.
Do	21	80	w.	Do	15	50	w.
Carson City, Nev	18	54	sw.	Do	21	76	w.
Cheyenne, Wyo	21	54	w.	Port Huron, Mich	21	52	w.
Chicago, Ill	24	50	ne.	Sacramento, Cal	21	51	se.
Cleveland, Ohio	5	54	nw.	Williston, N. Dak	9	50	nw.
Do	21	63	sw.	Winnemucca, Nev	21	54	s.

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table VII, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—Reports of 976 thunderstorm were received during the current month as against 732 in 1899 and 1,533 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 20th, 115; 23d, 114; 18th, 107.

Reports were most numerous from: Illinois, 195; Missouri, 83; New York, 59.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, 2d to 10th.

In Canada.—Auroras were reported as follows: Father Point, 17th; Minnedosa, 3d; Prince Albert, 19th.

Thunderstorms were reported as follows: Halifax, 9th; Port Stanley, Toronto, Parry Sound, 21st; Hamilton, Bermuda, 7th and 8th.

DESCRIPTION OF TABLES AND CHARTS.

By ALFRED J. HENRY, Professor of Meteorology.

For description of tables and charts see page 453 of REVIEW for October, 1900.

TABLE I.—*Climatological data for Weather Bureau Stations, November, 1900.*

Stations.	Elevation of instruments: Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Pressure, in inches: Mean actual, 8 a. m. + 8 p. m. ÷ 2.	Mean reduced.	Departure from normal.	Temperature of the air, in degrees Fahrenheit: Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches: Total.	Departure from normal.	Days with .01, or more.	Wind: Total movement, miles.	Prevailing direction.	Maximum velocity: Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
New England.							42.8	+2.6										79	4.30	+0.3										7.0	
Eastport	76	69	74	29.90	29.99	+.02	38.4	+1.7	61	2	44	15	17	32	24	36	33	82	4.40	+0.2	16	9,418	w.	44	ne.	27	3	10	17	7.6	12.4
Portland, Me	103	81	117	29.87	29.98	−.03	40.0	+2.0	70	2	46	15	17	34	23	36	31	75	5.50	+1.5	12	6,041	sw.	37	s.	9	6	9	15	6.7	3.7
Northfield	876	15	65	29.04	30.01	−.03	35.2	+2.3	70	21	43	3	17	27	29	32	28	78	3.99	+0.8	16	7,113	s.	48	sw.	21	1	9	20	8.1	22.4
Boston	125	115	181	29.88	30.02	.00	44.6	+4.0	73	2	52	21	17	38	26	42	39	81	4.17	−0.4	11	8,786	sw.	41	ne.	26	8	6	16	6.6	0.1
Nantucket	12	43	85	30.01	30.02	−.04	48.0	+3.3	62	1	53	28	17	43	18	45	41	79	3.96	+0.4	13	10,750	nw.	46	w.	9	2	9	19	7.7	
Block Island	26	11	70	29.99	30.02	−.03	47.4	+2.5	64	2	52	24	17	43	19	44	40	77	4.66	+0.5	16	14,633	sw.	71	w.	9	7	9	14	6.6	T.
Narragansett	.....	10	.....	.....	.....	.....	44.8	+1.8	66	2	52	18	17	37	25	.....	.....	.....	3.55	−0.6	15	.....	sw.	.....	.....	.....	13	5	12	.....	T.
New Haven	106	117	140	29.91	30.03	−.03	44.3	+3.2	72	2	52	21	17	37	25	40	36	78	4.14	+0.2	12	7,684	n.	44	w.	9	9	7	14	6.0	0.2
Mid. Atlan. States.							49.0	+4.3										74	3.00	−0.1										6.1	
Albany	97	84	113	29.92	30.04	−.02	41.8	+2.6	68	21	48	21	17	35	23	38	35	82	3.95	+1.0	13	6,138	s.	34	se.	21	3	7	20	7.9	14.4
Binghamton	875	79	90	.....	.....	.....	41.0	+3.0	68	21	48	17	17	34	28	.....	.....	.....	3.08	+0.8	16	5,215	w.	42	w.	21	3	4	23	8.4	2.7
New York	314	108	346	29.69	30.04	−.03	48.7	+5.3	72	21	55	28	16	43	24	43	38	70	4.26	+0.5	10	11,469	nw.	76	w.	21	5	10	15	6.7	T.
Harrisburg	374	94	104	.....	.....	.....	46.0	+3.6	74	21	53	24	16	39	26	.....	.....	.....	2.69	−0.1	11	5,796	w.	48	w.	21	4	11	15	6.7	T.
Philadelphia	117	168	184	29.94	30.06	−.04	49.3	+5.4	74	21	56	29	16	43	22	44	39	70	3.42	+0.2	7	7,943	nw.	46	sw.	21	7	6	17	6.7	
Scranton	805	111	119	.....	.....	.....	43.8	.....	73	21	51	22	16	37	29	.....	.....	.....	2.37	.....	16	6,110	sw.	48	w.	21	3	7	20	7.8	2.5
Atlantic City	52	68	76	30.02	30.08	.00	49.9	+5.2	74	23	57	25	16	43	26	45	41	75	2.16	−1.3	8	9,022	nw.	48	w.	21	6	12	12	5.9	
Cape May	17	47	51	30.07	30.09	.00	50.6	+4.0	69	23	56	32	16	45	20	46	.....	.....	2.03	−1.3	8	7,250	s.	33	w.	9	9	13	8	5.4	T.
Baltimore	123	68	82	29.93	30.06	−.04	49.6	+4.2	79	21	57	28	16	42	29	45	41	77	1.81	−1.2	8	3,722	nw.	29	nw.	21	6	14	10	6.0	T.
Washington	112	59	76	29.96	30.08	−.03	49.2	+4.7	79	21	58	25	17	40	31	43	39	73	2.15	−0.7	8	5,679	nw.	39	w.	9	11	9	10	5.0	0.5
Cape Henry	.....	5	34	.....	.....	.....	56.0	+4.1	79	21	64	33	10	48	32	.....	.....	.....	4.78	+1.2	10	10,583	sw.	48	n.	4	10	12	8	4.9	
Lynchburg	681	83	88	29.36	30.10	−.02	50.5	+4.2	79	23	60	26	17	41	36	43	38	72	2.31	−0.6	10	3,197	sw.	26	nw.	27	14	7	9	4.9	
Norfolk	91	102	111	29.99	30.09	−.01	55.4	+5.1	78	23	63	33	10	48	29	50	46	77	3.34	+0.2	10	7,283	s.	36	sw.	26	11	12	7	4.6	
Richmond	144	82	90	.....	.....	.....	52.1	.....	82	23	62	28	16	43	34	.....	.....	.....	2.87	.....	9	4,121	sw.	35	sw.	26	11	9	10	4.8	T.
S. Atlantic States.							57.3	+3.0										78	3.90	+0.9										4.5	
Charlotte	773	68	76	29.28	30.11	.00	52.0	+2.1	78	23	61	28	9	43	35	46	40	70	3.85	+0.8	10	4,921	ne.	35	s.	25	13	5	12	5.0	
Hatteras	11	17	36	30.09	30.10	+.02	59.2	+3.6	77	3	64	40	9	54	22	56	53	83	3.81	−1.4	11	10,722	sw.	53	w.	8	13	10	7	4.3	
Kittyhawk	8	12	30	.....	.....	.....	58.6	+5.1	75	25	65	34	11	52	26	.....	.....	.....	8.95	+4.9	8	10,847	ne.	.....	.....	.....	18	5	7	3.9	
Raleigh	376	93	101	29.72	30.12	−.02	53.6	+4.0	82	23	63	29	10	44	37	47	42	72	3.33	+1.2	8	4,377	n.	35	nw.	8	14	6	10	4.6	
Wilmington	78	82	90	30.03	30.12	+.02	57.8	+3.2	81	23	68	33	10	48	29	51	48	81	3.66	+1.2	6	6,008	ne.	38	nw.	8	11	14	5	3.9	
Charleston	48	14	92	30.09	30.14	+.04	59.6	+2.0	80	23	68	36	9	52	25	54	50	78	4.48	+1.5	8	7,056	nw.	36	nw.	8	10	15	5	4.7	
Columbia	.....	5	.....	.....	.....	.....	56.4	+1.5	85	23	68	30	10	45	30	.....	.....	.....	3.65	+1.3	9	.....	nw.	.....	.....	.....	11	6	13	5.4	
Augusta	180	89	103	29.92	30.12	+.02	56.5	+3.1	80	20	66	31	10	46	34	50	46	79	2.52	−0.5	6	4,186	nw.	30	nw.	8	14	8	8	4.5	
Savannah	65	79	89	30.06	30.12	.00	60.9	+3.1	82	21	70	36	9	52	27	54	51	79	3.64	+1.4	6	5,259	w.	35	sw.	25	11	9	10	4.7	
Jacksonville	43	69	84	30.07	30.12	+.04	63.5	+2.1	85	2	73	38	13	54	28	56	53	79	1.06	−1.5	5	4,569	n.	38	sw.	25	14	10	6	4.2	
Florida Peninsula.							71.3	+0.2										77	0.69	−1.9										4.3	
Jupiter	28	13	30	30.04	30.06	+.01	72.6	+0.8	83	*	79	47	27	66	23	66	62	75	0.73	−2.7	5	7,350	e.	24	s.	25	5	23	2	4.9	
Key West	22	43	50	30.04	30.06	+.05	74.3	+0.1	85	3	78	58	27	71	11	68	65	76	0.37	−1.9	5	8,076	ne.	30	n.	12	15	13	2	4.0	
Tampa	34	60	67	30.06	30.10	+.03	67.1	−0.3	87	1	77	42	13	58	27	59	56	79	0.96	−1.0	5	4,110	n.	24	s.	25	18	7	5	3.9	
East Gulf States.							59.8	+2.5										76	3.10	−0.6										4.5	
Atlanta	1,174	139	156	28.89	30.15	+.01	52.8	+1.0	77	20	61	26	9	44	29	47	41	71	3.62	+0.1	11	7,992	nw.	40	nw.	26	12	6	12	5.1	
Macon	370	93	99	.....	.....	.....	55.8	.....	79	20	66	30	9	46	35	.....	.....	.....	4.53	.....	9	4,317	nw.	26	sw.	25	10	14	6	4.9	
Pensacola	56	78	90	.....	.....	.....	62.0	+2.8	79	5	70	38	10	54	27	.....	.....	.....	1.45	−2.3	3	6,101	n.	36	nw.	25	17	4	9	4.2	
Mobile	57	88	96	30.08	30.14	+.04	60.4	+2.5	79	1	69	36	10	52	28	54	51	79	3.76	−0.1	9	5,286	n.	30	nw.	25	16	5	9	4.3	
Montgomery	223	100	112	29.90	30.14	+.01	58.0	+2.8	81	22	68	32	9	48	31	51	47	77	5.30	+1.9	6	4,428	n.	30	w.	25	14	6	10	4.6	
Meridian	375	84	93	.....	.....	.....	56.0	+2.6	82	21	66	29	12	46	36	.....	.....	.....	4.42	+1.2	6	3,778	n.	26	nw.	25	14	6	10	4.5	
Vicksburg	247	65	73	29.86	30.13	.00	58.2	+2.8	84	21	68	32	12	49	29	51	47	73	2.83	−2.0	5	4,929	se.	32	nw.	19	16	7	7	4.2	
New Orleans	51	88	121	30.08	30.14	+.06	64.2	+3.5	83	22	72	41	12	56	23	57	54	80	1.29	−2.9	6	5,967	ne.	32	nw.	25	15	10	5	4.4	
Port Eads	.....	27	.....	.....	.....	.....	66.6	+1.8	81	19	73	44	26	60	25	.....	.....	.....	2.15	−0.7	8	.....	ne.	.....	.....	.....	5	16	9	.....	
West Gulf States.							59.7	+3.2										75	2.44	−1.5										4.4	
Shreveport	249	77	84	29.87	30.14	+.03	58.0	+3.4	83	22	67	29	12	49	34	51	46	73	2.83	−2.0	7	4,881	se.	30	nw.	24	14	4	12	4.6	
Fort Smith	457	74	82	29.63	30.13	+.04	53.9	+4.6	82	22	65	27	12	42	36	46	41	72	2.46	−1.2	5	5,435	e.	34	sw.	23	13	8	9	4.5	
Little Rock	357	93	100	29.76	30.15	+.04	53.0	+2.2	76	22	62	27	12	44	32	47	43	74	4.88	−0.4	8	4,772	nw.	32	sw.	20	11	9	10	5.0	
Corpus Christi	18	42	50	30.08	30.10	+.02	66.3	+3.3	89	19	73	38	13	60	32	61	58	81	0.25	−2.8	2	8,041	se.	36	nw.	24	15	10	5	3.7	
Fort Worth	670	106	114	.....	.....	.....	57.8	.....	83	22	69	26	12	47	38	.....	.....	.....	8.56	.....	4	7,401	sw.	36	nw.	24	14	12	4	3.5	
Galveston	54	106	112	30.04	30.09	+.01	65.4	+3.0	82	8	71	42	12	60	24	60	57	80	1.64	−2.8	4	6,947	se.	39	nw.	24	14	8	8	4.8	
Palestine	510	54	61	29.58	30.14	+.03	59.1	+2.9	85	22	68	28	12	50	33	52	48	74	3.18	−1.3	7	5,655	s.	28	nw.	24	14	5	11	5.0	
San Antonio	701	95	104	29.37	30.12	+.03	62.4	+3.4	83	21	74	30	12	51	33	54	49	74	1.82	−0.2	8	4,347	se.	30	nw.	24	16	6	8	3.7	
Ohio Val. & Tenn.							47.0	+2.0										73	5.23	+1.7										5.7	
Chattanooga	762	106	112	29.34	30.17	+.04	51.8	+1.9	76	21	62	26	9	42	35	45	40	71	3.59	−0.2	12	5,011	nw.	32	nw.	26	11	11	8	4.8	T.
Knoxville	1,004	10	88	29.07	30.16	.00	49.2	+2.6	75	20	59	25	9	39	31	43	39	78	5.63	+1.8	10	4,894	sw.	38	s.	24	10	7	13	5.6	T.
Memphis	397	140	154	29.73	30.17	+.06	53.2	+3.3	76	22	62	31	9	45	27	47	42	71	4.66	0.0	9	7,216	sw.	36	sw.	20	14	8	8	4.4	T.
Nashville	546	128	134	29.57	30.16	+.05	50.0	+2.0	77	22	60	26	14	40	30	44	38	70	8.87	+5.0	10	4,794	nw.	30	s.	20	15	7	8	4.1	3.0
Lexington	989	75	102	.....	.....	.....	45.0	+1.4	74	22	54	20	16	36	29	.....	.....	.....	6.38	+2.7	10	8,320	sw.	37	n.	25	11	8	11	5.0	3.5
Louisville	525	114	136	29.55	30.13	+.02	47.2	+1.9	77	22	56	24	16	38	34	41	36	71	7.43	+3.4	11	6,889	sw.	31	w.	21	14	7	9	4.7	0.4
Evansville	434	72	82	.....	.....	.....	47.6	.....	78	22	56	23	14	39	33	.....	.....	.....	5.30	.....	11	6,299	s.	34	s.	22	17	4	9	4.1	
Indianapolis	822	154	164	29.21	30.11	+.02	42.4	+1.5	74	22	50	18	14	35	34	38	33	74	4.12	+0.3	14	8,570	s.	51	w.	21	5	5	20	7.0	0.1
Cincinnati	628	152	157	29.43	30.12	+.02	45.1	+1.2	73	22	54	21	16	37	32	40	35	72	4.50	+1.2	11	6,506	sw.	38	w.	21	9	11	10	5.6	T.
Columbus	824	87	100	29.20	30.10	+.01	42.4	+1.2	70	22	50	17	16	35	33	38	35	80	3.71	+0.4	15	6,550	sw.	37	sw.	21	6	6	18	6.9	6.1
Pittsburg	842	116	123	29.14	30.06	−.04	45.4	+2.6	74	19	53	20	16	38	32	40	35	70	3.64	+1.2	15	5,301	nw.	36	w.	21	6	10	14	6.6	4.7
Parkersburg	638	77	84	29.43	30.13	−.01	45.3	+2.5	76	19	54	15	16	37	35	40	35	74	5.50	+2.4	10	5,083	s.	40	nw.	13	3	8	19	7.2	2.1
Elkins	1,940	41	50	.....	.....	.....	41.6	.....	72	19	52	10	16	32	40	.....	.....	.....	5.93	.....	15	3,950	w.	34	w.	13	1	16	13	7.9	5.4
Lower Lake Region.							41.2	+2.2										78	4.06	+0.9										7.9	
Buffalo	767	178	206	29.17	30.01	−.02	41.7	+3.5	66	1	47	24	16	36	26	38	34	77	5.32	+1.8	22	12,675	w.	80	w.	21	1	6	23	8.6	17.9
Oswego	335	76	87	29.63	30.01	−.04	40.8	+2.3	68	21	47	17	16	34	28	37	34	80	6.53	+3.2	22	6,628	s.	48	sw.	21	3	4	23	8.1	23.2
Rochester	523	81	90	29.43	30.01	−.03	41.2	+3.8	67	21	47	24	15	35	30	37	34	79	4.45	+1.6	21	10,558	sw.	46	sw.	21	3	4	23	8.4	17.0
Erie	713	92	102	29.24	30.03	−.01	43.0	+2.0	61	1	49	23	15	37	29	39	36	74	4.76	+0.6	20	13,376	sw.	49	nw.	21	3	5	22	7.9	10.8
Cleveland	762	190	201	29.21	30.05	−.02	43.2	+2.5	66	22	48	18	16	38	29	38	33	76	3.01	+0.1	19	7,296	s.	63	sw.	21	3	3	24	8.0	7.5
Sandusky	629	62	70	29.36	30.06	.00	42.0	+1.6	66	4	49	16	16	36	29	38	33	77	2.61	−0.4	14	8,466	sw.	44	w.	21	4	6	20	7.8	1.9
Toledo	628	123	128	29.37	30.07	+.02	40.3	+1.1	67	1	47	18	16	34	31	35	33	79	2.67	−0.2	15	9,054	sw.	48	w.	21	5	6	19	6.9	4.4
Detroit	730	160	166	29.23	30.04	−.01	38.7	+0.6	68	1	45	16	16	33	26	36	32	[illegible]	3.10	+0.4	14	[illegible]	[illegible]	50	nw.	21	4	5	21	7.7	6.2
Upper Lake Region.							35.6	+0.2										83	2.50	0.0										7.7	
Alpena	609	61	65	29.33	30.02	.00	34.6	−0.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	86	2.56	−0.2	13	7,106	nw.	38	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.7	4.3
Escanaba	612	43	48	29.36	30.05	+.04	30.8	.....	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	87	1.52	−0.8	9	6,772	nw.	36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8.3	3.6
Grand Haven	632	55	64	29.34	30.04	+.02	37.9	+0.8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	82	4.69	+1.7	15	9,856	w.	48	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.6	13.5
Houghton	668	66	74	.....	.....	.....	30.3	.....	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.....	.....	.....	2.73	.....	18	5,626	nw.	28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8.4	18.8
Marquette	734	67	95	29.22	30.04	+.04	31.2	−0.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	87	1.61	−1.1	17	7,578	nw.	34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8.4	9.4
Port Huron	638	70	108	29.35	30.06	+.03	38.2	+1.8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	83	3.71	+0.9	18	9,320	sw.	52	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.2	8.8
Sault Ste. Marie	614	40	61	29.30	29.99	+.01	30.8	+0.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	85	2.84	+0.3	21	6,943	e.	40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8.7	17.6
Chicago	823	241	274	29.18	30.09	+.04	38.4	0.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	81	3.30	+0.6	13	12,574	w.	50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6.1	1.1
Milwaukee	681	124	142	29.32	30.09	+.04	36.2	+1.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	82	2.25	+0.2	15	8,069	w.	36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.4	4.6
Green Bay	617	49	57	29.39	30.08	+.02	31.4	−0.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	76	1.98	−0.4	11	6,434	w.	30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.7	7.2
Duluth	702	95	115	29.31	30.09	+.08	27.0	−2.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	81	0.54	−1.1	10	7,473	nw.	40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6.6	5.3
North Dakota.							20.4	−5.0										81	0.33	+0.1										5.0	
Moorhead	935	54	60	29.11	30.18	+.10	21.8	−2.4	59	3	30	−11	23	14	32	19	17	88	0.74	−0.2	8	7,092	nw.	28	se.	16	11	8	11	5.8	7.0
Bismarck	1,674	16	29	28.32	30.21	+.13	20.5	−5.4	59	3	29	−17	23	12	32	17	12	73	1.03	+0.4	7	5,568	nw.	41	nw.	9	16	6	8	4.7	9.7
Williston	1,875	15	31	28.11	30.22	+.14	18.8	−7.3	55	3	29	−22	21	8	45	16	13	81	0.71	+0.2	7	5,856	n.	50	nw.	9	16	10	4	4.4	7.1

TABLE I.—*Climatological data for Weather Bureau Stations, November, 1900*—Continued.

Stations.	Elevation of instruments: Barometer above sea level, feet.	Elevation of instruments: Thermometers above ground.	Elevation of instruments: Anemometer above ground.	Pressure, in inches: Mean actual, 8 a. m. + 8 p. m. ÷ 2.	Pressure, in inches: Mean reduced.	Pressure, in inches: Departure from normal.	Temperature of the air, in degrees Fahrenheit: Mean max. + mean min. ÷ 2.	Temperature: Departure from normal.	Temperature: Maximum.	Temperature: Date.	Temperature: Mean maximum.	Temperature: Minimum.	Temperature: Date.	Temperature: Mean minimum.	Temperature: Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches: Total.	Precipitation: Departure from normal.	Precipitation: Days with .01, or more.	Wind: Total movement, miles.	Wind: Prevailing direction.	Wind: Maximum velocity: Miles per hour.	Wind: Maximum velocity: Direction.	Wind: Maximum velocity: Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
Upper Mis. Valley.							38.0	+0.6										76	1.81	-0.4										5.6	
Minneapolis	......	99	208	......	......	......	28.6	-1.1	64	3	35	8	15	22	22	......	......	......	0.61	-0.1	7	7,096	nw.	32	n.	7	7	6	17	......	7.6
St. Paul	837	114	124	29.19	30.13	+.07	29.4	-0.5	62	3	35	9	15	24	19	26	23	79	0.88	+0.2	8	5,371	nw.	30	nw.	13	8	10	12	5.9	8.6
La Crosse	714	70	78	......	......	......	31.6	-1.8	66	3	37	10	15	26	24	......	......	......	1.04	-0.4	10	4,860	s.	28	nw.	13	6	9	15	6.3	2.5
Davenport	606	71	79	29.43	30.11	+.03	37.6	+0.8	66	3	45	15	15	30	28	33	30	80	1.48	-0.6	11	5,420	w.	31	nw.	21	9	8	13	6.1	1.5
Des Moines	861	84	88	29.20	30.17	+.08	35.6	-0.8	71	3	44	11	15	27	30	32	29	82	0.96	-0.8	7	5,144	n.	27	sw.	3	7	7	16	6.7	3.2
Dubuque	698	101	109	29.34	30.13	+.06	35.0	0.0	67	3	42	10	15	28	26	30	27	81	1.64	-0.5	12	5,463	nw.	34	nw.	13	7	11	12	5.9	4.3
Keokuk	614	63	78	29.45	30.13	+.05	39.8	+1.0	69	3	48	16	26	32	31	35	31	79	1.72	-0.4	8	5,680	nw.	36	nw.	13	10	9	11	4.9	0.2
Cairo	356	87	93	29.76	30.16	+.07	49.2	+3.0	75	22	58	26	14	41	32	43	37	69	4.63	+0.4	7	6,691	nw.	35	se.	20	11	9	10	4.9	T.
Springfield, Ill	644	82	92	29.41	30.12	+.03	42.2	+1.3	72	4	50	18	14	34	36	37	32	74	2.61	-0.4	11	7,348	nw.	30	w.	13	7	10	13	5.8	1.2
Hannibal	534	75	110	......	......	......	41.6	+1.4	70	4	51	19	14	32	37	......	......	......	1.27	-0.9	7	6,841	sw.	30	n.	15	14	7	9	4.6	0.3
St. Louis	567	111	210	29.50	30.13	+.03	47.4	+3.8	80	4	56	25	16	39	33	41	35	68	3.10	0.0	9	8,042	s.	41	w.	1	12	10	8	4.8	
Missouri Valley.							37.0	+0.2										72	0.79	-0.5										5.0	
Columbia	784	4	84	......	......	......	43.0	+0.6	73	4	54	17	14	32	35	......	......	......	1.24	-1.6	8	6,250	sw.	33	nw.	13	9	9	12	5.2	0.1
Kansas City	963	78	95	29.11	30.17	+.07	42.2	+1.5	71	3	50	21	21	34	33	37	31	71	1.26	-0.9	8	6,069	nw.	36	n.	13	14	6	10	4.5	T.
Springfield, Mo	1,324	100	103	28.70	30.13	+.04	47.5	+4.0	76	22	57	24	12	38	31	42	37	74	3.93	+0.4	9	7,279	s.	28	se.	16	15	11	4	3.5	T.
Topeka	......	81	......	......	......	......	41.6	+0.4	72	3	51	17	21	32	35	......	......	......	0.56	-0.6	7	......	n.	......	......	......	9	11	10	5.2	0.5
Lincoln	1,189	75	84	28.83	30.15	+.03	37.5	-0.6	74	3	48	11	21	28	31	32	26	71	0.03	-0.7	3	6,845	n.	40	n.	13	13	9	8	4.7	0.2
Omaha	1,105	115	121	28.92	30.14	+.03	37.0	+0.4	72	3	45	12	21	29	26	32	28	77	0.15	-0.9	4	5,962	n.	33	nw.	13	11	7	12	5.4	1.3
Valentine	2,598	39	40	27.36	30.18	+.07	33.0	-1.3	74	3	46	-6	21	20	43	27	21	72	0.26	-0.2	6	6,544	w.	42	nw.	10	13	6	11	5.4	1.3
Sioux City	1,135	96	164	......	......	......	33.6	-0.7	71	3	42	4	21	26	36	......	......	......	0.36	-0.4	8	7,676	nw.	38	nw.	10	13	8	9	5.2	2.2
Pierre	1,572	43	50	28.44	30.19	+.08	31.0	-0.9	74	3	41	-6	21	21	36	25	18	64	0.33	-0.1	5	4,889	nw.	34	nw.	13	12	8	10	5.3	3.3
Huron	1,306	56	67	28.71	30.18	+.07	28.2	-1.3	70	3	39	-3	21	17	38	23	18	74	0.17	-0.4	7	7,264	nw.	36	nw.	10	11	10	9	5.5	1.6
Yankton	1,233	52	58	......	......	......	32.8	0.0	74	3	43	-1	21	23	38	......	......	......	0.37	-0.3	6	5,327	nw.	33	nw.	10	14	7	9	5.0	3.6
Northern Slope.							31.8	-0.5										69	0.31	-0.2										4.9	
Havre	2,505	46	47	27.41	30.18	+.09	23.8	-6.1	65	8	35	-30	20	18	52	19	15	76	0.64	0.0	5	7,810	sw.	38	sw.	25	11	11	8	5.4	6.4
Miles City	2,371	42	50	27.55	30.17	+.04	27.8	-3.5	68	12	40	-12	20	16	44	23	20	86	0.39	0.0	5	3,481	sw.	48	nw.	9	16	8	6	3.9	3.7
Helena	4,110	88	93	25.85	30.20	+.06	29.5	-2.0	63	2	38	-17	20	21	32	25	18	62	0.30	-0.4	3	4,625	sw.	48	sw.	12	8	14	8	5.8	4.8
Kalispell	2,965	45	51	26.99	30.20	+.06	27.8	......	48	1	35	-12	21	21	27	26	23	84	1.87	......	12	3,550	nw.	24	nw.	16	5	7	18	7.1	14.9
Rapid City	3,234	46	50	26.66	30.12	-.01	33.6	-1.3	74	3	45	-6	21	22	36	27	20	66	0.34	0.0	5	6,062	se.	34	nw.	10	15	7	8	4.4	3.4
Cheyenne	6,088	56	64	24.02	30.17	-.04	37.4	+3.2	67	12	50	5	20	25	41	28	11	44	0.09	-0.2	4	7,812	nw.	54	w.	21	16	6	8	4.3	0.7
Lander	5,372	28	36	24.67	30.20	+.01	33.8	+4.2	65	3	48	8	20	19	47	26	20	70	0.33	-0.5	5	1,959	sw.	27	w.	23	18	7	5	3.7	3.3
North Platte	2,821	43	52	27.16	30.20	+.07	37.0	+1.8	76	3	50	4	21	24	49	29	22	64	0.09	-0.3	1	5,340	w.	36	nw.	10	12	12	6	4.6	1.0
Middle Slope.							43.4	+1.9										63	0.52	-0.3										4.2	
Denver	5,291	79	151	24.76	30.17	+.01	41.8	+3.8	74	12	56	16	20	28	45	31	13	39	0.37	-0.3	2	5,650	s.	46	w.	21	14	11	5	3.9	0.8
Pueblo	4,685	80	86	25.34	30.15	+.04	41.0	+2.2	79	12	58	11	25	24	61	31	17	47	0.12	-0.2	2	4,410	nw.	48	w.	21	20	7	3	3.5	0.4
Concordia	1,398	42	47	28.65	30.18	+.06	39.5	-0.5	73	8	49	7	21	30	37	34	30	79	0.20	-0.6	4	4,150	s.	24	nw.	10	14	8	8	4.8	1.8
Dodge	2,509	44	52	27.48	30.15	+.06	43.6	+3.4	79	4	57	17	25	30	49	35	29	70	0.09	-0.4	3	6,156	ne.	40	s.	17	16	8	6	4.2	0.3
Wichita	1,358	78	85	28.69	30.16	+.05	44.4	+1.6	76	4	54	22	21	35	34	38	32	71	0.21	-0.7	4	5,782	n.	30	n.	21	13	9	8	4.7	T.
Oklahoma	1,214	54	62	28.82	30.14	+.05	50.2	+0.9	78	22	62	28	12	38	36	43	38	72	2.10	+0.2	5	6,143	s.	31	n.	24	16	9	5	3.9	
Southern Slope.							52.0	+3.8										65	0.16	-0.6										2.8	
Abilene	1,738	45	54	28.28	30.13	+.02	56.0	+4.0	81	22	68	31	25	44	35	46	40	66	0.24	-1.1	2	5,252	s.	36	w.	20	20	5	5	3.4	
Amarillo	3,676	54	61	26.31	30.13	+.03	48.0	+3.5	77	4	61	24	11	35	42	39	32	64	0.08	-0.2	1	10,107	s.	56	n.	24	21	7	2	2.3	
Southern Plateau.							54.8	+3.5										40	0.31	+0.4										2.6	
El Paso	3,762	10	110	26.26	30.13	+.06	53.2	+1.7	80	8	68	29	26	38	44	39	25	44	0.23	-0.3	2	5,604	nw.	40	w.	20	19	7	4	2.4	
Santa Fe	7,013	47	50	23.32	30.15	+.05	41.3	+3.7	64	3	51	23	25	32	30	31	16	43	0.74	0.0	4	4,208	ne.	28	nw.	24	20	6	4	2.8	4.1
Flagstaff	6,907	12	25	23.40	30.24	......	37.8	......	64	4	52	13	12	24	49	32	......	......	2.13	......	7	......	e.	......	......	......	18	3	9	......	7.8
Phoenix	1,108	47	57	28.86	30.03	+.01	62.8	+4.9	89	4	77	40	30	49	41	48	33	41	1.73	+1.3	3	2,575	e.	23	e.	11	20	4	6	2.7	
Yuma	141	16	50	29.82	29.96	-.03	66.3	+4.4	91	2	80	43	14	52	42	51	34	35	T.	-0.3	0	4,812	n.	27	ne.	11	22	4	4	2.1	
Independence	3,910	51	58	26.04	30.04	-.04	50.4	+2.6	74	12	63	30	30	38	34	39	22	38	1.34	+1.1	6	4,694	nw.	36	sw.	18	19	8	3	2.8	
Middle Plateau.							42.5	+3.1										59	1.28	+0.2										4.8	
Carson City	4,720	82	92	25.31	30.12	.00	42.6	+1.3	68	4	55	22	29	21	42	37	29	64	1.54	0.0	5	4,388	s.	54	sw.	18	9	11	10	5.8	3.5
Winnemucca	4,344	59	70	25.72	30.16	-.02	40.3	+3.2	67	6	52	17	28	29	42	36	31	75	1.89	+1.8	11	6,453	ne.	54	s.	21	10	7	13	5.8	7.9
Cedar City	5,850	36	47	24.33	30.16	......	45.2	......	69	3	55	20	28	35	30	35	23	49	0.38	......	6	4,269	se.	30	sw.	20	14	4	12	4.7	0.4
Salt Lake City	4,366	105	110	25.70	30.17	-.04	44.6	+4.8	68	14	53	28	19	36	31	38	30	62	1.40	0.0	8	3,585	se.	45	n.	18	16	4	10	4.1	4.9
Grand Junction	4,608	43	50	25.48	30.21	.00	42.4	+3.0	65	6	55	19	14	30	42	32	19	46	0.27	-0.4	8	3,305	se.	29	w.	23	14	6	10	4.3	1.0
Northern Plateau.							38.6	+0.1										80	1.19	-0.2										6.6	
Baker City	3,471	53	58	26.48	30.15	-.03	37.0	+0.2	59	12	45	4	22	29	29	33	28	75	1.17	+0.2	11	3,976	s.	19	se.	2	9	4	17	6.0	7.3
Boise	2,739	61	68	27.25	30.16	-.05	41.5	+3.0	68	8	51	15	22	32	28	37	32	76	0.62	-0.7	8	2,340	se.	18	w.	18	11	8	11	5.3	4.4
Lewiston	770	52	61	......	......	......	40.8	-1.5	56	4	48	4	21	34	26	......	......	......	0.95	-1.0	11	2,441	e.	34	nw.	17	4	12	14	6.6	0.9
Pocatello	4,482	48	56	25.56	30.20	.00	38.1	+5.1	66	8	49	4	24	27	39	33	27	68	0.78	-0.5	10	6,589	s.	35	w.	23	9	5	16	6.2	7.3
Spokane	1,943	99	107	28.02	30.14	.00	34.2	-3.6	51	10	41	-10	21	28	26	32	31	88	2.21	+0.5	12	3,490	ne.	24	e.	17	0	3	27	8.9	7.6
Walla Walla	1,000	65	73	29.01	30.11	-.08	40.3	-2.7	64	2	47	-2	21	34	37	39	38	94	1.40	0.0	9	3,122	s.	30	se.	17	4	13	13	6.7	2.8
N. Pac. Coast Reg.							44.7	-0.7										86	5.49	-1.8										6.5	
Neah Bay	50	7	24	29.91	29.97	-.04	44.1	-2.3	54	24	48	25	21	40	13	43	41	87	10.43	-3.5	16	6,449	e.	35	nw.	8	8	8	14	6.2	1.9
Port Crescent	259	15	20	......	......	......	40.2	-2.1	59	12	48	15	21	33	24	......	......	......	3.38	-3.0	13	2,518	e.	40	sw.	2	4	13	13	6.7	4.0
Seattle	123	114	121	29.88	30.02	-.05	44.4	-0.5	61	10	50	21	21	39	22	42	40	85	3.80	-0.8	14	3,939	se.	30	se.	2	7	8	15	6.7	2.8
Tacoma	213	113	120	......	......	......	42.6	-1.6	60	10	49	16	21	36	26	......	......	......	5.23	-0.9	16	4,361	sw.	29	ne.	20	3	6	21	7.9	7.5
Astoria	20	57	64	......	......	......	47.0	+0.1	65	10	52	26	21	42	20	......	......	......	9.13	-1.0	18	......	e.	36	se.	1	9	6	15	6.1	2.5
Portland, Oreg	154	203	213	29.86	30.02	-.08	45.8	+0.2	63	12	52	19	21	40	19	44	41	83	4.50	-1.3	16	6,535	nw	45	s	23	6	9	15	6.4	1.2
Roseburg	518	56	67	29.43	30.00	-.13	48.6	+3.4	63	1	54	28	22	48	20	47	45	88	1.94	-1.8	14	2,051	e.	18	sw.	30	7	11	12	6.0	T.
Mid. Pac. C'st Reg.							54.9	+1.3										79	4.77	+1.3										6.0	
Eureka	62	60	69	29.96	30.02	-.07	53.3	+2.7	72	13	59	36	22	48	22	51	50	90	8.06	+4.0	12	2,912	se.	26	se.	16	5	11	14	6.5	
Mount Tamalpais	2,375	11	18	27.56	30.04	......	53.6	......	75	13	59	36	21	49	18	46	39	67	4.31	......	9	11,642	e.	......	sw.	21	13	11	6	4.8	
Red Bluff	332	50	56	29.67	30.03	-.07	54.8	+0.9	82	12	64	38	21	45	32	50	46	78	3.23	+0.1	10	3,161	n.	24	se.	20	14	6	10	5.1	
Sacramento	69	106	117	29.95	30.03	-.05	55.2	+1.7	78	12	64	37	29	47	31	51	47	77	4.50	+2.4	9	5,268	n.	51	se.	21	3	12	15	7.1	
San Francisco	155	161	107	29.88	30.04	-.04	56.3	0.0	79	12	62	45	30	50	21	53	50	82	3.91	+1.2	9	4,972	n.	43	s.	21	8	12	10	5.4	
Point Reyes Light	......	12	16	......	......	......	54.9	+1.1	83	12	61	44	24	48	33	......	......	......	4.16	+1.1	11	6,418	se.	30	nw.	21	4	8	18	7.4	
S. Pac. Coast Reg.							62.1	+4.6										64	5.14	+3.8										4.2	
Fresno	330	67	70	29.67	30.03	-.03	57.5	+2.1	84	4	68	38	28	47	40	51	45	72	4.61	+3.4	6	3,079	nw.	24	e.	21	9	5	16	6.3	
Los Angeles	338	74	82	29.63	29.98	-.03	66.5	+7.3	96	3	78	48	28	54	34	54	45	57	6.53	+5.2	7	2,965	w.	20	se.	21	15	9	6	3.7	
San Diego	87	94	102	29.87	29.97	-.05	64.6	+6.0	89	3	72	51	24	57	27	54	45	57	1.43	+0.6	7	3,995	nw.	23	s.	22	24	0	6	2.2	
San Luis Obispo	201	10	46	29.82	30.04	.00	59.8	+2.8	92	12	78	38	14	46	51	51	46	70	8.01	+6.0	6	3,247	n.	28	s.	21	14	9	7	4.4	
West Indies.																															
Basseterre	29	41	54	29.91	29.94	......	79.3	......	87	7	85	69	30	74	15	74	72	77	3.91	......	17	5,554	ne.	24	e.	19	13	16	1	3.7	
Bridgetown	30	57	65	29.88	29.91	......	80.0	......	88	1	86	72	20	74	16	75	73	79	4.43	-1.8	19	4,642	e.	24	e.	8	7	17	6	5.4	
Cienfuegos	52	62	67	29.95	30.00	......	75.8	......	88	18	84	60	28	67	22	69	68	84	0.15	......	4	5,218	ne.	21	e.	20	17	5	8	4.0	
Grand Turk	11	6	20	......	......	......	79.7	......	89	*	86	69	27	74	17	......	......	......	3.50	......	12	......	ne.	......	......	......	1	22	7	5.9	
Havana	57	87	105	29.97	30.03	......	74.6	......	88	3	81	61	27	68	20	68	66	77	0.96	-2.1	7	7,982	e.	33	ne.	20	7	17	6	5.5	
Kingston	286	38	52	29.63	29.93	......	78.8	......	92	19	87	68	24	70	21	71	69	79	1.08	......	8	3,728	ne.	19	se.	1	9	17	4	5.0	
Port of Spain	40	65	66	29.85	29.89	......	79.7	......	89	30	87	70	19	72	19	74	72	80	5.10	......	20	2,486	e.	18	e.	12	1	15	14	6.7	
Puerto Principe	352	55	62	29.64	29.99	......	75.6	......	89	4	84	62	25	68	24	71	70	90	1.68	......	14	4,813	ne.	26	e.	18	7	12	11	6.2	
Roseau	25	37	47	29.89	29.91	......	79.8	......	90	7	86	71	19	73	16	73	70	74	3.59	......	14	3,514	ne.	21	s.	23	12	12	6	4.6	
San Juan	82	48	73	29.87	29.95	......	78.8	......	89	7	84	70	29	73	15	73	71	78	4.50	-2.0	19	6,836	e.	38	se.	18	23	7	0	2.7	
Santiago de Cuba	82	26	33	29.86	29.94	......	79.6	......	91	17	88	66	26	71	21	72	70	82	3.81	......	11	3,118	ne.	15	se.	8	14	10	6	4.6	
Santo Domingo	57	37	44	29.90	29.96	......	77.7	......	88	10	85	66	22	70	19	73	71	85	3.10	......	15	3,991	n.	15	n.	22	13	17	0	3.5	
Willemstad	75	39	46	29.80	29.87	......	80.8	......	88	8	85	70	22	76	13	75	73	78	6.75	......	17	6,748	e.	27	e.	16	6	18	6	5.8	

NOTE.—The data at stations having no departures are not used in computing the district averages.

*Two or more dates.

TABLE II.—*Climatological record of voluntary and other cooperating observers, November, 1900.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Alabama.					
Ashville	77	27	51.6	3.83	
Benton				3.92	
Bermuda	85	31	59.4	2.78	
Birmingham	79	28	55.4	5.84	
Brewton	85	28	58.8	1.92	
Bridgeport				5.21	
Burkeville				2.93	
Calera				4.70	
Citronelle	83	34	61.9	1.56	
Clanton	75	29	54.0	5.16	
Daphne	80e	30f	58.4f	1.01	
Decatur	79	24	52.5	3.87	T.
Demopolis				2.34	
Eufaula a	81	25	56.4	2.17	
Eufaula c				2.59	
Eutaw	83	30	56.6	3.88	
Evergreen	81	31	57.6	2.51	
Florence a				3.20	
Florence b	78	25	51.6	3.08	
Gadsden	80	25	55.2	4.37	
Goodwater	81	30	56.4	5.57	
Greenville				3.88	
Hamilton	74	26	53.2	3.85	
Healing Springs	84	30	58.2	2.60	
Helena				4.95	
Highland Home	81	30	58.4	3.22	
Letohatchee				3.44	
Livingston a	82	28	56.2	3.52	
Lock No. 4	78	27	53.4	5.04	
Madison Station	78	23	52.6	3.78	T.
Maplegrove	77	20	50.8	4.73	
Marion	82	30	59.5	4.30	
Newbern	80	28	56.0	4.25	
Newburg	72	30	52.0	1.70	
Newton	77	26	53.2	1.99	
Notasulga				3.90	
Oneonta	75	24	52.1	5.01	
Opelika	77	29	54.3	7.80	
Oxanna	79	28	55.0	5.24	
Pineapple	84	25	58.2	1.20	
Prattville	81	29	56.8		
Pushmataha	80	30	57.4	2.34	
Riverton	78	25	51.2	4.52	
Scottsboro	79	25	51.5	2.98	T.
Selma	84	31	58.4	2.00	
Talladega	79e	25	52.8e	4.25	
Tallassee				4.30	
Thomasville	86	31	56.7	1.20	
Tuscaloosa	81	27	53.8	4.64	
Tuskegee	83	28	57.6	5.01	
Union Springs	82	28	56.6	3.15	
Valleyhead	77	23	51.4	4.29	
Verbena				6.57	
Wetumpka	82	30	56.9	5.13	
Arizona.					
Allaire Ranch				0.69	
Arivaca	89	34	58.8	1.82	
Arizona Canal Co. Dam	88	41	62.4	2.26	
Aztec *5	97	41	66.8	0.26	
Benson *1	80	40	60.7	0.28	
Bisbee	76	33	54.4	1.31	
Bowie *5	72	37	54.1	0.20	
Buckeye	80	32	60.4	0.90	
Camp Creek	81	38	59.2	2.77	
Casagrande *1	84	48	63.0	1.25	
Champie Camp	92	35	61.5	2.05	
Cochise *1	79	35	56.0	0.00	
Congress	82	38	61.8	1.77	
Dragoon Summit				0.98	
Dudleyville	88	25	56.9	1.45	
Fort Apache	75	20	46.6	4.86	T.
Fort Defiance	63	16	38.8	0.70	
Fort Grant	90	36	59.4	2.87	
Fort Huachuca	77	34	57.1	0.55	
Fort Mohave	87	38	61.4	0.55	
Gilabend *1	90	46	66.6	0.00	
Jerome	74	33	53.5	2.10	
Maricopa *1	78	40	57.1	1.25	
Mesa	89	40	62.0	2.30	
Mount Huachuca	76	28	55.2	2.51	
Natural Bridge				2.55	
Nogales	86	25	58.1	1.33	
Oracle	75	37	57.7	3.01	
Oro				0.62	
Pantano *1	85	50	63.9	0.00	
Parker	94	32	63.1	0.20	
Peoria	91	38	62.9	2.90	
Phoenix	87	34	59.8	1.65	
Pima	80			2.02	
Pinal Ranch				7.87	
Prescott	75	18	44.8	2.35	T.
San Carlos	86b	26b	54.9b	2.86	
Sentinel *1	98	50	69.1	0.50	
Signal	92	29	59.2		
Silverking				6.64	
Strawberry	77	13	43.0	1.90	0.5
Arizona—Cont'd.					
Supai	73	33	52.4	0.10	
Tombstone	76	36	56.0	0.25	
Tonto	81	31	57.6	2.56	
Tuba	67	24	46.2	T.	
Tucson	88	32	60.2	3.45	
Vail *5	84	45	64.6	1.40	
Walnut Grove				1.10	
Willcox *1	90	26	60.7	0.48	
Winslow	69	18	43.6	0.30	
Yarnell				2.86	
Arkansas.					
Amity	79	28	53.8	2.94	
Arkadelphia	78	24	53.2	3.77	
Arkansas City				1.79	
Batesville	81	24	52.4	4.17	
Beebranch *	81	27	55.8	4.30	
Blanchard Springs	82	24	55.2	2.80	
Brinkley	78	23	52.2	6.97	
Camden a				2.62	
Conway	79	24	53.1	4.00	
Corning	77	22	48.3	3.65	
Dallas	76	26	53.2	4.46	
Dardanelle				3.70	
Elon	82	26	56.6	4.03	
Fayetteville	78	20	49.4	3.53	T.
Fulton				3.71	
Hardy	77	25	49.5	3.42	
Helena a				7.26	
Helena b	80	29	54.2	6.68	
Hot Springs b				5.42	
Jonesboro	82	24	51.7	5.74	
Keesees Ferry	83	21	50.6	3.81	T.
Lacrosse	78	25	50.8	2.21	
Lonoke	80	23	52.2	9.39	
Lutherville	73	24	51.4	4.76	
Malvern	79	23	52.9	4.64	
Marianna	78	24	51.0	5.03	
Marvell	80	26	51.6	3.97	
Mossville	74	24	48.8	4.48	
Mount Nebo	74	27	49.8	3.77	T.
New Gascony	80	27	54.1	2.88	T.
Newport a				3.94	
Newport b	79	23	51.6	3.69	
Newport c	79	22	50.5	3.85	
Oregon	81	24	50.4	4.30	
Osceola	81	22	51.3	8.90	
Ozark	80g	25c	52.2c	3.36	
Pinebluff	80	25	53.5	4.06	
Pocahontas	72	26	49.4	3.24	
Pond	74	18	49.6	5.40	T.
Prescott	79	25	53.7	4.73	
Rison	81	24	53.6	3.15	
Rosadale	81	23	55.0	1.87	
Russellville	79	25	49.4	3.10	
Silversprings	82	21	50.4	4.41	
Spielerville	82	26	52.4	4.93	
Stamps	80	24	53.4	4.66	
Stuttgart	81	23	52.2	4.34	
Texarkana	87	25	60.2	3.35	
Warren	82	26	54.4	3.23	
Washington	79	25	54.5	3.17	
Wiggs	76	22	52.0	4.74	
Winslow	74	21	47.6	4.47	
Witts Springs	74	22	48.8	6.63	
California.					
Angiola	87	30	56.0	1.96	
Bakersfield	88	34	56.3	1.00	
Ballast Point L. H.				1.47	
Bear Valley				14.30	44.0
Bellevue				1.82	15.0
Berkeley	78	43	55.8	5.04	
Beverly				5.40	75.0
Bishop				2.69	
Boca *1	62	10	37.3	5.73	38.0
Bodie	60	−4	30.0	3.93	36.0
Bowman				11.47	33.0
Branscomb				8.23	0.8
Caliente *1	87	42	57.9	2.13	
Campbell	82	38	55.8	5.64	
Cape Mendocino L. H.				7.45	
Cedarville	66	16	40.1	2.53	25.0
Chico *1	86	40	57.0	4.75	
Cisco *1	61	23	39.4	10.43	48.0
Claremont	89	37	60.0	8.72	
Corning *1	75	40	54.0	3.80	
Craftonville	92	44	63.2	3.93	
Crescent City	74	31	51.1	6.07	
Crescent City L. H.				5.57	
Cuyamaca *5	65	31	49.1	11.97	
Delano *1	80	40	59.6	2.20	
Delta *1	80	36	54.0	10.51	1.0
Deweyville	85	39	56.4	1.65	
Drytown	80	34	55.6	6.84	
Dunnigan *1	74	41	56.1	4.27	
Durham *1	80	38	54.8	4.63	
Edmanton *1	70	28	43.4	13.13	20.0
California—Cont'd.					
East Brother L. H.				1.80	
Elcajon	98	33	63.4	2.61	
Elmdale	88	31	55.6	3.74	
Elsinore	96	38	63.0	5.04	
Escondido	94	27	56.3	4.05	
Fallbrook	92	41	63.2	5.06	
Fordyce Dam				8.43	46.0
Fort Ross	78	40	54.6	6.00	
Gilroy (near)	92	36	58.5	6.48	
Goshen *1	81	40	56.4	2.87	
Grand Island *5	78	38	57.1	2.61	
Grass Valley				9.57	
Greenville	70	26	43.3	7.17	25.0
Hanford	82	34	55.7	1.65	
Healdsburg	84	32	54.7	5.14	
Hollister	89	34	56.4	5.69	
Humboldt L. H.				7.24	
Indio *1	87	45	62.5	0.17	
Iowa Hill *1	74	36	53.6	9.65	
Irvine	102	50	70.6	5.14	
Jackson (near)	76	34	53.2	8.32	
Jolon				7.53	
Kennedy Gold Mine	76	36	52.0	8.75	
Kent				7.72	
Kingsburg *1	79	42	60.2	2.60	
Kono Tayee	68	38	52.2	3.89	
Lakeside				3.60	
Lamesa				2.38	
Lankershim	85	37	56.2	3.64	
Laporte *1	67	27	41.8	14.30	37.1
Las Fuentes Ranch				5.79	
Legrand	83	36	55.3	5.13	
Lemoncove		39		5.85	
Lemoore *1	78	36	54.9	2.13	
Lick Observatory	74	30	51.1	7.76	T.
Lime Point L. H.				3.00	
Lodi	76	40	55.8	4.87	
Los Gatos b	85	39	57.4	9.27	
Mammoth *1	88	49	67.4	0.00	
Mare Island L. H.				3.00	
Merced b	86	37	56.2	4.16	
Mills College				5.11	
Milo				8.28	
Milton (near)				4.25	
Modesto *1	88	45	59.2	4.24	
Mohave				1.66	
Mokelumne Hill *3		40	52.8	7.60	
Monterio	76	34	58.2	3.08	
Monterey *5	82	40	60.9	4.65	
Morena	81	33	59.0	5.30	
Mountainview				4.03	
Mutah				5.00	
Napa b	89	38	57.2	6.33	
Needles	82	42	62.8	0.12	
Nevada City	73	32	49.7	9.22	
Newhall. *1	90	40	58.6	5.24	
Niles *1	84	45	59.2	4.67	
North Bloomfield	77	33	51.6	10.99	2.0
North Ontario	84	44	61.2	8.17	
North San Juan *5	82	34	55.8	8.81	
Oakland a	74	43	56.2	5.00	
Ogilby *5	95	56	73.6	0.00	
Oleta *1	77	37	51.0	7.76	
Orland *1	76	34	53.2	4.61	
Palermo	83	34	55.3	3.63	
Paso Robles b	87	31	56.2	6.10	
Peachland *5	75	36	54.6	5.86	
Piedras Blancas L. H.				4.67	
Pigeon Point L. H.				3.52	
Pilot Creek				9.23	14.0
Pine Crest	90	46	67.4	7.38	
Placerville	78	30	50.7	9.82	
Point Ano Nuevo L. H.				5.75	
Point Arena L. H.				4.15	
Point Bonita L. H.				4.55	
Point Conception L. H.				2.27	
Point Firmin L. H.				1.70	
Point George L. H.				3.02	
Point Hueneme L. H.				4.07	
Point Lobos	77	44	54.8	3.49	
Point Loma L. H.				0.84	
Point Montara L. H.				4.95	
Point Pinos L. H.				6.95	
Point Sur L. H.				6.45	
Pomona (near)	93	38	61.6	8.38	
Poway *5	93	35	62.6	3.19	
Quincy	61	29	43.0	8.42	16.0
Ranch House				4.02	
Redding	80	37	55.0	3.03	
Redlands	89	42	62.4	3.88	
Reedly	86	36	57.0		
Represa	72	36	54.6	4.37	
Riovista	79	39	55.3	4.77	
Riverside	92	44	64.3	2.51	
Roe Island L. H.				2.95	
Rosewood	81	30	51.4	2.71	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
California—Cont'd.					
Sacramento [a]	75	38	54.6	5.14	
Salinas*[1]	79	41	66.6	5.65	
Salton*[1]	93	49	67.3	0.00	
San Bernardino	94	34	61.2	6.10	
San Jacinto	89	35	59.8	4.57	
San Leandro*[5]	81	40	55.6	5.09	
San Luis L. H				4.82	
San Mateo*[1]	70	44	59.4	5.39	
San Miguel*[1]	84	37	57.3	4.45	
San Miguel Island	88	48	61.2	1.70	
Santa Ana	98	43	63.4	3.72	
Santa Barbara [a]	90	49	64.3	3.99	
Santa Barbara L. H				3.00	
Santa Clara [a]				4.50	
Santa Cruz [b]	89	36	55.5	7.87	
Santa Cruz L. H				8.03	
Santa Maria	92	40	61.7	5.40	
Santa Monica	92	47	64.1	5.66	
Santa Paula	92	46	65.8	4.71	
Santa Rosa*[5]	73	38	54.8	5.60	
Shasta	82	30	56.0	5.82	
Sierra Madre	89	47	64.8	10.96	
Snedden				4.52	
Sonoma				4.60	
S. E. Farallone L. H				3.62	
Stanford University	76	40	55.4	3.81	
Stockton	74	50	60.2	4.65	
Summerdale	75	25	48.0	18.91	38.0
Susanville	60	25	40.4	3.29	20.0
Tehama*[1]	79	40	56.1	4.61	
Tejon Ranch	85	33	58.4	1.06	
Templeton*[1]	80	36	51.0	9.37	
Thermalito	82	37	56.4	3.95	
Trinidad L. H				6.83	
Truckee*[1]	66	22	37.4	2.50	25.0
Tulare [b]				2.70	
Tulare [c]	88	36	57.6	2.41	
Ukiah	76	27	51.4	5.42	
Upperlake	80	30	51.8	5.08	
Upper Mattole*[1]	70	32	48.4	6.56	
Vacaville*[1]	81	37	56.2	6.26	
Ventura	93	48	63.6	4.47	
Visalia [b]	86	31	57.0	2.86	
Volcano Springs*[1]	93	42	66.5	0.05	
Walnutcreek	78	40	57.6	4.91	
West Saticoy				3.73	
Wheatland	77	35	54.2	3.98	
Williams*[1]	80	42	58.0	2.58	
Wilmington*[1]	94	40	59.1	3.25	
Wire Bridge*[5]	76	34	54.5	5.87	
Yerba Buena L. H				3.65	
Yreka	66	13	43.2	2.00	12.0
Colorado.					
Alford	74	−4	38.1	0.09	1.2
Arkins				0.12	1.5
Blaine	85	11	45.8	0.00	
Boulder	76	12	44.6	0.19	3.1
Boxelder				0.00	
Breckenridge	57	−6	29.0	0.44	5.9
Buenavista				0.17	1.5
Canyon	78	14	43.7	0.49	1.0
Castlerock	72	8	38.9	0.33	4.0
Cedaredge	68	16	39.2	1.01	4.0
Cheyenne Wells		12		T.	T.
Clearview	64	1	33.5	0.80	9.5
Collbran	63	11	37.8	1.03	5.5
Colorado Springs	70	12	40.6	0.31	2.5
Cope	76	4	38.6	0.14	1.4
Cripplecreek	58	10	38.6	0.93	11.0
Delta	70	12	39.3	0.57	3.1
Dumont				0.19	2.5
Durango	73	4	35.1	2.22	27.0
Fort Collins	74	9	37.8	0.07	1.2
Fox				0.20	2.0
Gilman				1.02	12.0
Gleneyrie	65	10	40.0	0.38	4.5
Greeley	76	4	39.6	0.04	T.
Grover				T.	T.
Hamps	74	5	37.3	0.25	2.0
Hoehne	78	12	44.5	0.02	
Holly	80	11	42.0	0.10	
Holyoke (near)	78	−4	36.8	0.07	1.0
Hugo				0.16	2.0
Husted	72	8	37.2	0.35	3.2
Lake Moraine	57	1	31.4	1.65	16.8
Lamar	82	11	42.8	0.06	T.
Laporte				0.05	0.5
Las Animas	78	9	42.4	0.00	
Lay	64	3	34.6	0.33	4.0
Leadville (near)*[1]	50	0	26.4	0.62	9.2
Leroy	74	−13	37.6	0.12	1.8
Longs Peak	55	3	33.1	0.44	5.5
Mancos	68	13	37.8	2.43	13.0
Marshall Pass				1.33	20.0
Mitchell				0.30	5.0
Montrose				0.47	5.0
Colorado—Cont'd.					
Moraine	64	9	37.0	0.47	7.0
Pagoda	61	9	36.0	0.85	8.5
Parachute	64	19	39.1	1.24	5.0
Perrypark				0.40	T.
Rockyford	77	9	40.6	0.06	
Rogers Mesa	65	16	40.0	0.67	4.9
Saguache	69	3	37.0	0.07	1.0
Salida	74	6	38.8	0.17	2.2
San Luis	69	−5	34.2	0.38	4.3
Santa Clara	69	11	39.8	0.63	4.5
Sapinero				0.75	13.5
Sargents				0.62	9.0
Seibert				0.32	1.0
Silt	64	17	38.5	1.16	5.5
Springfield					T.
Sugarloaf	62	9	36.8	0.20	2.0
Trinidad	78	17	47.2	0.12	
Troutvale	58	−18	25.9	0.85	13.0
T. S. Ranch	61	21	41.4	0.64	4.5
Twinlakes				0.21	3.0
Vilas				0.00	
Wagon Wheel	64	−14	27.6	1.16	14.5
Walden	55[e]	−8[e]	28.1[e]	0.23	3.0
Wallet				0.08	1.0
Westcliffe	64	1	35.0	1.26	12.4
Wray	80	−5	38.8	0.20	2.5
Yuma				0.17	3.0
Connecticut.					
Bridgeport	72	19	45.6	5.25	0.3
Canton	72	14	41.0	6.33	T.
Colchester	73	15	44.0	6.78	0.5
Falls Village				5.55	12.5
Hartford [b]	70	22	43.0	5.13	0.5
Hawleyville	69	18	43.6	6.82	2.6
Lake Konomoc				6.43	
Middletown	74	17	43.5	6.88	0.2
New London	72	24	46.7	5.15	0.5
North Grosvenor Dale	73	11	40.6	6.30	
Norwalk	70	16	43.8	4.92	
Southington	68	16	43.0	5.70	1.0
Storrs	70	16	41.4	6.79	2.1
Voluntown	73	9	42.6	6.63	T.
Wallingford				5.97	
Waterbury	71	16	43.4	5.96	0.5
West Cornwall	65	15	33.9	5.29	16.0
West Simsbury				5.98	1.0
Winsted*[1]	66	19	39.3		
Delaware.					
Milford				2.75	
Millsboro	76	23	50.3	3.81	T.
Newark	74	22	47.2	1.57	
Seaford	74	26	50.5	2.23	T.
District of Columbia.					
Distributing Reservoir*[5]	75	28	49.8	1.95	
Receiving Reservoir*[5]	75	29	49.0	2.05	
West Washington	81	24	49.1	2.35	0.4
Florida.					
Archer	87	31	62.5	0.42	
Bartow	86	33	65.8	1.61	
Brooksville	84	38	64.8	0.22	
Carrabelle	79	36	61.2	0.32	
Clermont	90	41	67.7	0.10	
Dalkeith	84	32	60.6	3.03	
De Funiak Springs	82	29	60.0	2.64	
Deland	91	28	64.3		
Earnestville	87	40	66.0	0.55	
Eustis	91	38	66.9	0.72	
Federal Point	83	36	63.3	1.19	
Fort George*[1]	84	44	64.7		
Fort Meade	86	33	66.4	2.23	
Gainesville	85	38	64.2	0.69	
Huntington	84	36	62.4	1.04	
Hypoluxo	90	48	74.8	2.79	
Inverness	88	31	63.1	0.62	
Jasper	84	32	61.1	1.35	
Kissimmee	87	36	67.6	1.62	
Lake Butler	89	29	62.8	1.41	
Lake City	86	32	61.6	2.90	
McAlpin	87	31	61.8	1.79	
Macclenny	91	30	61.8	2.09	
Manatee	84	38	65.8	2.55	
Marco	88	48	73.1	0.50	
Marianna	82	31	58.2	0.90	
Merritt Island	86	46	69.4	0.82	
Micanopy	89	32	63.6	0.67	
Middleburg	86	29	60.1	1.09	
Myers	84	45	68.0	1.91	
New Smyrna	84	37	64.7	0.40	
Nocatee	92[d]	36[d]	67.8[d]	1.14	
Ocala	91	32	64.2	0.26	
Orange City	85	33	65.4	0.66	
Orlando	84	40	66.4	1.51	
Plant City	88	33	64.0	1.69	
Rockwell	88	34	66.0	3.00	
St. Andrews	81	33	60.6	3.53	
St. Augustine	85	42	62.8	2.59	
Florida—Cont'd.					
St. Francis	86	30	63.0	0.63	
Sebastian	82	45	68.0	0.51	
Stephensville*[1]	84	37	58.9	1.24	
Sumner	89	27	61.8	0.82	
Switzerland*[1]	83	39	61.0	1.83	
Tallahassee	79	36	59.7	1.52	
Tarpon Springs	82	33	63.3	0.40	
Georgia.					
Adairsville	75	27	51.0	3.35	
Albany	84	32	59.4	4.07	
Allapaha	82	30	58.4	1.25	
Allentown	82	27	58.4	6.61	
Americus	81	30	56.6	2.91	
Athens [b]	73	30	52.8	3.74	
Auburn	77	24	53.6	3.12	
Blakely	80	30	57.6	2.55	
Brent	80	28	56.4	4.36	
Canton				4.44	
Carlton				3.46	T.
Clayton	76	19	50.0	3.76	
Columbus	78[f]	31[f]	55.8[f]	4.30	
Covington	77	26	53.9	3.69	
Dahlonega	79	18	48.7	2.94	
Dublin				2.15	
Elberton	76	27	54.8	3.57	
Experiment	73	27	53.0	3.18	
Fitzgerald	84	28	59.2	3.52	
Fleming	83	28	58.0	1.83	
Fort Gaines	79	32	58.2	2.56	
Franklin	77	27	54.0	3.04	
Gainesville	73	27	52.4	3.16	
Gillsville	78	23	53.4	3.25	
Greenbush	75	24	51.6	4.66	
Harrison	82	29	57.4	4.45	
Hawkinsville	80	33	57.2	4.27	
Hephzibah				1.70	
Jesup	84	31	59.6	1.56	
Lost Mountain	76	26	52.6	3.16	
Lumpkin	79	29	58.6	3.78	
Marshallville	78	29	58.2	4.20	
Mauzy	86	28	60.8	1.66	
Millen	84	28	57.0	2.86	
Monticello	80[c]	29[c]	58.2[c]		
Morgan	83	28	54.4	2.00	
Naylor	85	28	60.0	1.85	
Newnan	75	27	52.8	2.86	
Oakdale				2.56	
Point Peter	80	26	55.1	3.62	T.
Poulan	84	28	58.6	4.49	
Putnam	80[c]	27[c]	56.8[c]	3.18	
Quitman	82	28	58.7	1.41	
Ramsey	77	24	51.4	4.58	T.
Resaca				5.35	
Rome	76	26	51.4	5.43	
Statesboro	84	29	59.8	2.70	
Talbotton	81	27	54.3	5.44	
Tallapoosa	74	25	52.4	3.46	
Thomasville	82	31	61.2	1.28	
Toccoa				3.11	
Valona	84	30	62.3	3.06	
Washington				2.90	
Waycross	83	32	59.1	2.96	
Waynesboro	79	23	54.8	2.27	
Westpoint	78	29	55.2	2.40	
Woodbury				5.16	
Idaho.					
Albion	67	10	37.8	1.39	4.0
American Falls	68	0	34.5	0.90	8.0
Atlanta	58	6	33.6	1.72	17.0
Blackfoot	64	1	34.2	1.00	10.0
Burnside	59	0	30.6	0.90	11.0
Chesterfield	57	−6	28.7	1.61	11.0
Downey	61	9	35.3	0.74	7.0
Forney	56	3	30.8	0.39	9.2
Garnet	73	16	42.0	0.62	6.2
Hagerman	75	4	42.0	1.05	
Kootenai	48	−20	25.6	2.76	24.0
Lake	60	−14	33.9	1.40	14.0
Lakeview	54	1	34.6	2.79	15.0
Lost River [e]	60	−8	28.0	1.28	14.0
Moscow	55	−5	35.3	2.14	1.2
Murray	46	−6	31.0	3.69	12.0
Oakley	67	15	41.1	0.75	T.
Ola	67	15	38.9	1.52	7.7
Paris	63	3	34.0	0.86	
Payette	72	13	41.5	0.44	2.4
Pollock	63	14	39.8	1.73	2.5
Priest River	47	−7	32.1	2.69	15.5
St. Maries [d]	57	−8	37.8	3.16	11.5
Soldier	62	−9	32.4	1.37	13.0
Swan Valley	58	−8	32.4	1.46	13.5
Weston	64	18	38.0	2.49	5.5
Illinois.					
Albion	77	17	45.2	3.85	
Alexander	70	14	42.8	3.05	0.2
Ashton	67	11	35.6	2.00	2.2

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Illinois—Cont'd.	°	°	°	*Ins.*	*Ins.*
Astoria	67	15	40.0	1.16	1.2
Aurora *a*	66	9	36.8	3.23	.....
Bloomington	72	14	40.8	3.96	2.7
Bushnell	69	9	38.9	1.40	3.5
Cambridge	63	14	37.0	2.16	4.0
Carlinville	76	16	43.8	2.43	T.
Centralia	70	17	40.2	3.15	
Charleston	73	17	42.8	2.81	T.
Chemung	62	3	33.9	2.83	5.2
Chester	.....	.....	.....	5.21	
Cisne	79	17	46.4	3.45	
Coatsburg	67	14	40.5	0.91	0.5
Cobden	77	17	47.6	4.00	
Decatur	73	14	41.9	3.48	0.5
Dixon	68	12	36.8	2.10	0.7
Dwight	68	10	38.2	3.35	3.0
Effingham	75	17	44.3	3.27	T.
Equality	78	13	47.2	4.07	
Flora	78	17	45.4	3.04	T.
Friendgrove *[5]	74	24	47.3	4.55	
Galva	65	11	37.4	1.63	5.3
Glenwood	.....	.....	.....	3.11	2.0
Grafton	.....	.....	.....	2.29	
Grayville	82[d]	22[d]	48.8[d]	3.60	
Greenville	77	16	45.8	4.05	
Griggsville	73	11	42.9	1.66	
Halfway	77	18	47.5	3.40	
Halliday	75	17	47.4	3.89	
Havana	76	12	44.4	1.57	T.
Henry	69	10	39.4	2.25	4.0
Hillsboro	74	17	43.3	2.78	T.
Joliet	68	10	38.1	3.10	6.5
Kishwaukee	65	6	34.3	1.93	3.0
Knoxville	66	8	37.2	2.28	5.5
Lagrange	76	7	37.4	3.32	2.5
Laharpe	66	14	38.4	1.38	1.8
Lanark	65	6	32.9	1.88	6.2
Loami	.....	.....	.....	2.74	T.
McLeansboro	78	18	46.0	3.97	
Martinsville	68	20	43.3	2.96	
Martinton	70	10	39.6	5.78	2.5
Mascoutah	78	20	44.4	3.84	
Mattoon	74	20	45.6	5.24	T.
Minonk	71	12	38.8	2.66	5.5
Monmouth	67	8	37.3	2.39	2.0
Monticello	79	13	42.4	4.04	0.5
Morrisonville	72	12	43.9	2.21	T.
Mount Carmel	.....	.....	.....	4.32	
Mount Pulaski	72	12	42.0	4.04	0.5
Mount Vernon	78	15	43.5	3.49	
New Burnside	78[d]	17[d]	47.2[d]	3.99	
Olney	78	16	45.3	2.54	
Ottawa	68	16	39.9	3.16	1.0
Palestine	79	16	42.9	4.06	T.
Pana	72	9	43.3	3.63	T.
Paris	78	16	42.6	3.64	
Peoria *a*	.....	.....	.....	2.27	.....
Peoria *b*	69	17	40.8	1.87	0.5
Philo	73	15	41.2	3.56	T.
Plumhill	78	10	45.8	3.33	
Rantoul	72	15	41.5	2.82	1.0
Raum	75	20	47.9	6.52	T.
Riley	63	8	35.0	2.00	2.9
Robinson	80	17	44.7	3.82	
Roundgrove	61	12	32.8	1.31	1.6
Rushville	70	16	40.2	1.48	0.7
St. Charles *[1]	61	9	36.0	3.27	3.7
St. John	83	17	48.5	3.27	
Scales Mound	63	2	32.2	1.34	3.0
Shobonier	78	13	44.2	2.51	T.
Strawn	71	12	40.4	4.32	3.0
Streator	77	13	40.4	2.57	T.
Sullivan	72	13	42.4	3.44	T.
Sycamore	62	9	35.8	2.23	1.0
Tilden	76	18	46.0	3.38	
Tiskilwa	68	12	37.3	2.03	3.0
Tuscola	74	15	41.5	3.46	T.
Walnut	65	14	37.8	1.64	1.1
Wheaton *[2]	.....	13	36.4	2.77	6.0
Winchester	76	16	41.4	1.79	
Winnebago	67	6	34.6	2.10	6.0
Yorkville	69	9	37.6	2.66	2.2
Zion	65	10	34.9	1.44	T.
Indiana.					
Anderson	74	16	41.8	3.55	1.6
Angola	64	12	37.6	5.58	12.2
Auburn	67	9	38.4	4.45	1.6
Bedford	.....	20	.....	1.80	T.
Bloomington	78	19	44.4	3.30	T.
Bluffton	70	12	40.5	3.88	1.7
Bright	71	18	44.7	4.91	1.0
Butlerville	75	18	44.4	4.91	T.
Cambridge City	74	11	41.6	3.35	0.7
Columbus	77	19	44.8	3.63	
Connersville	75	14	41.8	3.97	T.
Crawfordsville	80	14	42.0	4.50	
Indiana—Cont'd.					
Delphi	72	12	39.9	4.14	1.0
Edwardsville *[1]	73	23	46.9	7.08	1.2
Fairmount	72	12	41.0	3.73	3.5
Farmland	72	13	40.4	3.70	2.5
Franklin *[1]	76	21	43.0	3.31	T.
Greencastle	71	18	42.6	4.19	T.
Greensburg	72	12	44.2	2.44	
Hammond	75	11	38.9	2.84	4.0
Hector	70	10	40.8	5.90	2.5
Huntington	69	16	39.5	5.15	8.5
Jeffersonville	75	24	47.0	6.82	T.
Knightstown	74	15	40.9	3.71	0.5
Kokomo	72	17	42.0	4.29	1.8
Lafayette	72	14	41.3	4.60	0.6
Laporte	76	13	40.4	4.99	13.0
Logansport	71	15	41.4	4.16	T.
Madison *a*	75	18	46.0	4.98	T.
Madison *b*	.....	.....	.....	5.33	
Marengo	76	19	45.0	5.33	T.
Marion	72	14	41.0	4.50	3.7
Markle	71	12	40.8	4.20	3.0
Mauzy	75	13	42.1	3.65	1.0
Northfield	73	14	40.9	4.50	1.0
Paoli	78	19	45.4	5.04	0.5
Peru	69	14	40.6	3.47	2.2
Prairie Creek	78	19	43.0	3.41	
Princeton	.....	.....	.....	4.05	
Rensselaer	69	15	41.0	4.90	
Richmond	71	12	41.4	3.76	T.
Rockville	75	16	42.2	3.72	T.
Salem	78	17	46.1	4.18	
Scottsburg	76	18	45.6	4.25	T.
Seymour	75	19	44.0	4.03	T.
Shelbyville	74	18	42.5	2.40	
South Bend	70	9	40.1	5.26	17.5
Syracuse	70	11	38.8	6.68	21.0
Terre Haute	77	19	45.2	4.37	
Topeka	70	10	40.0	4.53	T.
Valparaiso	68	14	39.8	0.80	
Veedersburg	73	15	43.7	3.43	1.2
Vevay	74	20	47.4	5.55	1.0
Vincennes	79	19	44.7	4.38	
Washington	78	22	45.0	2.53	
Winamac	77	10	41.9	5.58	7.0
Worthington	70	17	43.2	3.57	
Indian Territory.					
Bengal	79	21	52.9	2.42	
Claremore [d]	85	21	51.9	2.65	T.
Colbert	84	.....	.....	0.13	
Fairland	80	23	49.6	3.27	
Hartshorne	82	21	55.0	1.73	
Healdton	82	19	53.7	0.62	T.
Lehigh	82	22	54.7	0.84	
Marlow	80	25	52.4	1.07	
Muscogee	81	23	52.4	2.14	
Pauls Valley	79	20	51.8	1.40	
Ryan	76	28	51.8	1.31	
South McAlester	.....	.....	.....	1.92	
Tahlequah	76	22	52.0	3.30	T.
Tulsa	.....	.....	.....	1.70	
Wagoner	80[e]	22[e]	51.6[e]	2.63	
Webbers Falls	81	23	54.0	4.10	
Iowa.					
Afton	67	8	34.5	1.11	0.5
Albia	67	10	34.7	1.85	3.0
Algona *[1]	62	0	30.9	0.95	9.5
Alta *a*	64	0	30.1	0.68	5.0
Amana	66	9	35.0	1.02	1.7
Ames *b*	72	5	33.3	0.51	4.0
Ames (near)	.....	.....	.....	0.77	6.7
Atlantic	71	5	34.4	0.30	3.0
Audubon	71	8	33.1	.....	.....
Bancroft	65	— 1	29.4	0.60	5.0
Batavia	.....	.....	.....	1.55	T.
Baxter	71	4	33.2	1.02	5.5
Bedford	72	3	35.9	0.99	2.0
Belknap	71	14	37.0	2.78	4.0
Belleplaine	68	7	32.5	1.90	6.0
Bonaparte	69	15	38.0	2.10	2.5
Britt	64	— 4	29.2	0.45	2.8
Buckingham	.....	.....	.....	1.10	5.2
Burlington	69	15	39.8	2.88	3.0
Bussey	.....	.....	.....	1.66	2.0
Carroll	69	6	33.7	0.60	6.0
Cedar Rapids	69	9	34.9	0.15	1.5
Chariton	70	10	36.3	1.60	4.7
Charles City	65	— 6	29.8	1.85	10.0
Clarinda	74	6	37.0	0.48	1.3
Clearlake	64	— 4	30.0	0.50	3.0
Clinton	65	13	35.6	1.60	1.9
College Springs	69	4	36.0	0.47	2.4
Columbus Junction	68	12	37.4	1.15	0.5
Coon Rapids	67	8	33.6	0.63	5.0
Corning	67	6	35.6	0.18	1.5
Council Bluffs	77	10	36.0	0.12	1.2
Crawfordsville	.....	.....	.....	1.22	1.7
Iowa—Cont'd.					
Cresco	63	— 9	27.6	1.22	3.9
Cumberland	.....	.....	.....	0.20	2.0
Danville	.....	.....	.....	3.35	4.0
Decorah	66	— 1	30.0	1.60	5.5
Delaware	65	2	32.0	1.77	4.0
Denison	68	4	33.0	0.10	1.2
Desoto	66	10	35.0	1.41	3.0
Dows	68	— 3	30.5	1.06	6.2
Eldon	72	13	37.2	2.09	1.7
Elkader	74	— 2	32.6	2.07	8.0
Emerson	.....	.....	.....	0.11	.....
Estherville	68	— 1	27.8	0.60	6.0
Fayette	66	— 4	29.7	1.68	8.2
Fonda	66	— 6	29.3	1.16	5.8
Forest City	65	— 1	29.8	0.38	1.5
Fort Dodge	68	0	32.3	1.08	4.0
Fort Madison	.....	.....	.....	3.08	2.0
Fruitland	68	11	37.0	.....	.....
Galva	79	3	31.0	0.70	7.0
Gilman	.....	.....	.....	1.11	2.0
Glenwood	75	7	37.5	T.	T.
Grand Meadow *[1]	58	1	30.0	1.67	7.5
Greene	68	— 6	31.0	1.46	.....
Greenfield	68	8	35.4	0.80	2.3
Grinnell	67	6	34.0	1.02	.....
Grinnell (near)	68	6	33.8	1.85	7.0
Grundy Center	68	2	32.0	1.69	3.0
Guthrie Center	68	9	34.8	1.30	9.5
Hampton	69	2	31.4	0.93	5.2
Harlan	67	6	33.4	0.56	4.7
Hawkeye	.....	.....	.....	1.70	7.0
Hedrick	67	10	34.4	1.66	1.5
Hopeville	68	10	34.6	0.76	.....
Hoprig	.....	.....	.....	0.15	1.5
Humboldt	65	3	31.5	1.02	7.1
Independence	67	1	31.7	1.26	3.7
Indianola	71	9	35.6	0.93	2.3
Iowa City	69	12	36.1	1.43	1.0
Iowa Falls	67	0	30.1	1.31	6.5
Keosauqua	67	17	38.4	2.04	0.5
Knoxville	70	6	34.0	0.93	1.5
Lacona	.....	.....	.....	1.15	3.5
Lansing	71	2	32.6	1.92	5.3
Larrabee	67	— 4	31.2	0.48	5.3
Leclaire	.....	.....	.....	1.59	2.5
Lemars	68	1	32.2	0.34	2.5
Lenox	67	8	35.7	0.45	1.3
Logan	67	2	32.4	0.41	.....
Maple Valley	.....	.....	.....	0.79	5.0
Maquoketa	69	9	36.6	1.57	0.5
Marshalltown	72	4	34.2	1.26	4.0
Monticello	66	5	33.4	1.30	3.0
Mooar	74	13	36.6	1.22	.....
Mountayr	69	6	36.6	1.38	.....
Mount Pleasant	66	11	37.4	1.54	1.5
Mount Vernon *b*	69	7	35.4	0.93	2.2
Murray	.....	.....	.....	0.03	0.3
New Hampton	66	— 5	30.0	1.50	7.5
Newton	68	5	34.2	1.60	6.0
Northwood	66	— 2	29.6	1.14	5.5
Odebolt	65	5	33.3	0.64	4.5
Ogden	69	2	32.6	0.66	6.0
Olin	65	8	34.0	1.18	1.5
Onawa	74	7	34.6	0.29	.....
Osage	62	— 3	28.8	1.44	7.7
Osceola	70	10	35.5	1.28	4.0
Oskaloosa	71	10	35.0	2.54	1.5
Ottumwa	71	14	38.1	2.12	0.2
Ovid	71	10	35.8	1.73	3.3
Pacific Junction	72	5	36.0	0.11	0.7
Pella	72	8	34.2	0.73	2.5
Perry	69	7	34.6	0.84	6.0
Plover	55	0	30.2	0.60	6.0
Primghar	72	0	32.7	T	T.
Redoak	76	5	38.0	0.16	0.3
Ridgeway	66	0	32.3	1.88	5.4
Rockwell City	62	2	32.2	0.65	5.0
Ruthven	57	— 2	26.8	0.24	2.4
Sac City	67	2	32.0	0.49	4.9
Scranton	67	8	33.5	0.30	3.0
Sheldon	65	2	29.7	0.77	5.6
Sibley	68	— 2	29.6	0.64	6.0
Sigourney	70	10	36.2	1.96	1.2
Sioux Center	63	0	30.4	0.55	4.5
Spirit Lake	62[e]	— 3[e]	29.1[e]	0.68	6.8
Storm Lake	64	— 1	31.3	0.46	5.1
Stuart	63	8	33.2	0.35	3.5
Thurman	70	4	36.1	0.10	1.0
Toledo	73	5	34.6	1.51	6.0
Villisca	72	5	37.2	0.74	2.0
Vinton *[1]	69	6	33.0	1.16	2.2
Wapello	72	15	38.6	1.42	2.0
Washington	69	8	35.0	1.12	0.7
Washta	.....	.....	.....	0.27	2.7
Waterloo	69	1	32.0	0.97	4.0
Waverly	67	1	31.8	1.11	5.7

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Iowa—Cont'd.	°	°	°	*Ins.*	*Ins.*
Westbend *[1]	65	−1	28.8	0.70	7.0
West Union	......	......	......	0.05	0.5
Whitten	66	0	30.8	0.68	0.5
Wilton Junction	69[c]	11[c]	37.6[c]	1.65	......
Winterset	70	9	34.4	0.92	4.0
Woodburn	......	......	......	0.97	4.2
Kansas.					
Abilene	71	9	40.8	0.44	1.0
Achilles	80	−2	38.4	0.27	0.2
Altoona	78	21	45.4	0.59	T.
Anthony	......	......	......	0.32	T.
Atchison *a*	72	21	39.8	0.78	1.5
Burlington	72	21	42.9	0.77	
Campbell	70	5	37.9	0.20	2.0
Chanute	76	22	45.4	1.40	......
Colby	80	9	39.0	0.23	
Columbus	75	21	46.2	2.08	
Coolidge	75	8	40.0	T.	
Delphos	76	6	40.3	0.27	1.0
Dresden	89	5	41.2	T.	T.
Ellinwood	74	15	40.6	0.65	3.0
Emporia	71	23	43.6	0.60	T.
Englewood	82	16	43.3	0.15	T.
Eureka	......	......	......	1.37	
Eureka Ranch	77	7	40.4	0.15	1.5
Fallriver	81	21	45.0	0.89	
Fanning	73	7	38.0	0.72	2.0
Frankfort	74	4	39.2	0.50	2.0
Garden City	78	12	42.8	T.	
Gove	......	......	......	T.	T.
Gregory	69	8	38.0	0.16	1.5
Grenola	74	20	44.8	0.65	T.
Horton	70	8	39.0	0.82	2.0
Hoxie	90[d]	5[d]	41.2[d]	0.15	T.
Hutchinson	79	19	43.0	0.52	1.5
Independence	75	26	46.6	1.37	
Lakin	78	15	42.0	T.	
Lawrence	69	19	41.1	1.38	T.
Lebanon	75	2	37.4	0.30	3.0
Lebo	74	22	42.0	1.31	T.
Little River	73[h]	18	39.9[d]	0.46	1.5
Macksville	76	14	41.8	0.28	
McPherson	72	15	43.1	0.64	......
Madison	78	20	42.1	1.37	
Manhattan *b*	74	5	41.0	1.01	1.5
Manhattan *c*	75	5	40.2	0.99	1.5
Marion	69	21	43.6	0.80	T.
Medicine Lodge	82	19	44.1	0.13	T.
Minneapolis	75	5	39.4	0.23	2.0
Moran	74	24	43.1	1.47	
Mounthope *[1]	72	23	42.7	0.23	T.
Ness City	75	16	44.2	0.25	1.0
Newton	71	19	41.6	0.06	
Norwich	79	20	45.4	0.19	T.
Oberlin	......	......	......	0.10	
Olathe	73	20	43.2	0.90	T.
Osage City	76	19	42.2	0.42	T.
Oswego	78	23	47.6	1.45	
Ottawa	74	20	41.5	1.20	
Phillipsburg	74	10	33.2	0.70	7.0
Pratt	76	16	44.7	0.49	1.5
Rome	86	22	45.4	0.11	T.
Salina	78	11	40.6	0.41	2.0
Scott	79	9	39.7	0.00	
Sedan	76	22	45.1	0.75	
Seneca	73	5	38.8	0.33	2.5
Toronto	80	21	44.3	1.62	
Tribune	65	11	31.2	T.	T.
Ulysses	75[c]	10[c]	41.5[c]	T.	
Valley Falls	71	11	40.2	0.74	1.7
Wakeeney (near) *[1]	78	19	39.8	0.07	0.5
Wallace	......	......	......	0.22	
Wamego *[1]	73	8	38.8	0.42	1.1
Winfield	74	24	45.8	0.07	
Yates Center	75	19	42.4	1.31	
Kentucky.					
Alpha *[3]	......	24	50.0	8.87	2.0
Bardstown	82	19	47.4	7.47	1.5
Blandville	76	20	47.8	5.91	T.
Bowling Green	77	23	47.3	10.94	
Burnside	......	......	......	9.22	1.0
Carrollton	74	18	45.3	5.56	T.
Catlettsburg	80	19	46.2	6.32	1.0
Earlington	79	22	48.9	8.60	T.
Edmonton	77	18	47.8	10.05	3.0
Eubank	75	19	45.0	8.05	3.0
Falmouth	......	......	......	8.06	2.5
Fords Ferry	79	17	47.6	7.93	
Frankfort	78	20	46.2	7.71	T.
Georgetown	72	20	45.6	......	......
Greensburg	78	17	46.8	6.85	0.2
Henderson	78	23	46.8	4.87	T.
Hopkinsville	77	20	47.8	11.84	
Irvington	77	20	45.9	7.27	T.
Jackson	75	23	47.4	7.43	T.
Leitchfield	77	22	45.5	11.06	0.5

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Kentucky—Cont'd.	°	°	°	*Ins.*	*Ins.*
Loretto	77	17	46.2	7.10	1.5
Maysville	75	15	44.8	9.34	1.1
Middlesboro	76	23	49.8	10.76	0.2
Mount Sterling	72	21	44.6	7.92	T.
Owensboro	79	22	49.0	7.23	
Owenton	80	17	44.6	8.06	
Paducah *a*	......	......	......	6.53	T.
Paducah *b*	80	25	50.4	6.22	......
Princeton	73[e]	20[e]	48.2[e]	5.07	
St. John	76	17	46.4	8.81	0.7
Scott	72	18	44.4	4.90	3.5
Shelby City	75	16	46.0	8.73	2.0
Shelbyville	72	19	45.0	10.36	4.0
Vanceburg	75	18	44.1	8.00	
Warfield	83	19	46.6	6.41	T.
Williamsburg	75	24	50.0	8.71	T.
Louisiana.					
Abbeville	88	38	63.0	1.05	
Alexandria	88	28	60.4	5.41	
Amite	89	27	61.4	2.23	
Baton Rouge	88	31	61.1	1.14	
Burnside	88	29	61.6	0.91	
Calhoun	82	27	55.4	3.25	
Cheneyville	86	28	58.9	8.11	
Clinton	86	27	60.2	1.26	
Como	88[j]	24[j]	56.7[j]	3.76	
Covington	86	29	59.7	1.20	
Donaldsonville	92	33	63.0	0.85	
Emilie	84	32	61.1	0.80	
Farmerville	83	29	56.2	3.37	
Franklin	82	33	61.0	0.72	
Grand Coteau	87	29	60.2	1.92	
Hammond	89	28	61.6	0.63	
Houma	89	30	63.4	1.47	
Jeanerette	87	31	62.6	0.75	
Jennings	88	26	61.8	2.72	
Lafayette	88	27	61.0	1.49	
Lake Charles	92[c]	32	64.4	5.78	
Lake Providence	88	29	58.4	2.62	
L'Argent	89	24	58.4	5.03	
Lawrence	84	......	......	0.98	
Libertyhill	87	25	57.6	4.95	T.
Mansfield	85	28[c]	57.9[c]	4.81	
Melville	87	27	60.4	5.70	
Minden	88[c]	25[c]	58.4[c]	4.58	
Monroe	87	30	58.6	4.42	
Montgomery	81	30	56.4	4.05	
New Iberia	85[e]	32[b]	62.4[e]	1.55	
Opelousas	86	27[c]	61.0	2.87	
Oxford	84	22	56.2	3.49	
Paincourtville	87	31	61.8	0.48	
Plain Dealing	84	24	55.9	2.83	
Prevost	......	......	......	0.50	
Rayne	90	27	61.4	1.75	
Robeline	88	22	56.0	5.70	
Ruston	85	32	58.4	3.83	
Schriever	89	29	62.4	1.54	
Southern University	87[c]	33[c]	62.2[c]	1.26	
Sugar Ex. Station	83	36	61.4	1.66	
Sugartown	84	34	59.8	7.54	
Venice	87	43	66.8	4.50	
Wallace	88	31	63.0	1.80	
White Sulphur Springs	......	......	......	4.45	
Maine.					
Bar Harbor	65	16	39.4	5.48	3.5
Belfast *[6]	70	11	37.2	5.41	5.0
Bemis	64	8	37.5	8.58	18.5
Calais	68	9	35.6	5.61	11.0
Carmel	72	4	36.2	4.36	7.0
Cornish *[1]	68	12	37.4	7.39	4.2
Fairfield	69	10	36.8	4.55	4.0
Farmington	70	6	35.9	8.50	12.0
Flagstaff	64	3	31.8	5.66	20.5
Gardiner	69	12	38.0	5.28	4.0
Lewiston	71	16	38.4	4.95	4.1
Mayfield	64	7	35.0	7.43	15.5
North Bridgton	71	8	37.6	6.70	6.0
Orono	72	9	36.4	4.59	7.8
Rumford Falls	66	14	35.4	7.22	15.6
Winslow	72	6	37.4	5.00	5.0
Maryland.					
Annapolis	75	28	49.6	2.40	
Bachmans Valley	72	20	44.4	4.50	T.
Boettcherville	75	17	47.4	3.83	
Boonsboro *a*	75	20	47.4	3.08	1.5
Charlotte Hall	78	22	49.2	1.89	T.
Chestertown	73	28	49.1	2.13	
Chewsville	75	17	46.8	3.07	
Clearspring	74	20	46.3	4.50	2.5
Coleman	......	......	......	1.83	
Collegepark	78	23	48.2	2.42	T.
Cumberland *a*	81	22	50.2	4.09	T.
Cumberland *b*	......	......	......	3.88	T.
Darlington	76	24	47.4	2.06	
Deerpark	72	4	39.6	5.68	5.0
Easton	78	26	49.3	2.59	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Maryland—Cont'd.	°	°	°	*Ins.*	*Ins.*
Ellicott City	......	......	......	1.08	T.
Fallston	76	24	47.8	2.34	T.
Frederick	76	26	48.5	3.37	1.0
Frostburg	71	13	43.5	5.34	1.0
Grantsville	71	11	40.9	5.89	7.5
Greatfalls	78	23	46.6	2.35	......
Greenspring Furnace	76	18	45.7	3.52	T.
Hagerstown	76	21	47.8	3.46	0.2
Hancock	76	18	46.6	3.66	
Harney	......	......	......	3.17	
Jewell	77	28	52.0	1.94	T.
Johns Hopkins Hospital	79	24	47.8	2.08	T.
Laurel	80	22	47.6	2.75	T.
McDonogh	76	21	45.2	2.17	
Mount St. Marys Coll	68	25	47.5	3.50	T.
Newmarket	77	23	47.2	3.06	T.
Pocomoke	75	28	52.4	4.39	
Princess Anne	75	23	50.2	4.10	T.
Queenstown	74	27	49.6	1.91	
Rockhall *b*	73	24	49.4	2.01	
Sharpsburg	75	20	48.6	2.72	0.8
Smithsburg *a*	74	17	47.2	2.55	1.0
Smithsburg *b*	73	18	46.9	3.30	3.0
Solomons	76	29	52.8	2.48	T.
Sudlersville	78	26	50.0	2.26	
Sunnyside	75	5	40.4	6.52	7.8
Takoma Park	77[d]	25	47.6	3.23	0.8
Taneytown	77	22	47.9	3.38	
Van Bibber	75	26	46.6	2.12	
Westernport	70	16	42.2	4.81	1.5
Westminster	74	20	47.1	3.00	
Woodstock	78	25	48.2	1.49	T.
Massachusetts.					
Amherst	65	14	40.9	5.89	T.
Bedford	70	14	41.4	5.05	T.
Bluehill (summit)	72	18	42.2	5.44	0.8
Cambridge	73	17	43.2	5.24	
Chestnuthill	74	15	43.6	5.30	T.
Cohasset	......	......	......	5.68	......
Concord	71	12	40.4	5.09	0.4
East Templeton *[1]	62	16	38.0	5.52	7.5
Fallriver	72	20	47.0	4.26	T.
Fitchburg *a* *[1]	65	16	39.7	6.35	1.0
Fitchburg *b*	66	16	40.2	5.91	1.0
Framingham	71	13	42.6	5.37	......
Groton	67	13	39.5	5.84	5.0
Hyannis *[1]	68	20	45.7	5.10	T.
Jefferson	......	......	......	6.79	2.2
Lawrence	70	14	41.6	4.42	0.2
Leeds	66	11	40.4	5.91	T.
Leominster	......	......	......	6.11	1.8
Longplain	......	......	......	2.82	......
Lowell *a*	68	16	41.8	6.18	......
Lowell *b*	70	15	41.4		
Middleboro	74	9	43.1	3.95	T.
Monson	68	14	41.7	6.30	3.0
New Bedford *a*	68	20	45.8	4.65	
Pittsfield	68	18	39.2	4.38	6.0
Plymouth *[1]	72	19	44.6	6.28	T.
Princeton	......	......	......	6.32	5.5
Provincetown	60	28	46.2	3.87	T.
Somerset *[1]	72	16	45.5	4.38	T.
South Clinton	......	......	......	6.44	4.0
Springfield Armory	70	17	41.1	5.86	0.5
Sterling	......	......	......	6.20	T.
Taunton *c*	72	9	42.8	4.91	......
Westboro	70	10	43.4	6.41	0.5
Weston	69	13	42.0	4.66	0.2
Williamstown *[1]	64	11	39.8	3.59	6.2
Winchendon	......	......	......	7.22	10.5
Michigan.					
Adrian	63	12	38.2	3.90	2.2
Agricultural College	64	10	35.3	5.10	11.5
Allegan	64	10	39.2	1.67	3.0
Alma	67	12	35.5	4.23	9.0
Ann Arbor	66	14	37.5	3.73	6.1
Arbela	68	12	36.4	4.91	8.5
Baldwin	69	10	32.0	3.15	9.5
Ball Mountain	66	15	37.4	2.52	6.6
Baraga [c]	68	18	31.3	......	......
Battlecreek	64	12	37.4	4.74	12.3
Bay City	68	20	37.2	2.97	5.5
Berlin	64	12	35.8	3.48	10.0
Berrien Springs	76	8	39.0	7.67	33.0
Big Rapids	65	9	34.0	4.05	T.
Birmingham	70	10	37.6	3.13	4.5
Boon	59[g]	10[g]	30.6[g]	5.43	16.8
Calumet	60	13	28.9	1.98	13.5
Carsonville	75	8	38.0	2.86	4.0
Cassopolis	68	0	34.1	6.55	28.0
Charlevoix	65	21	37.0	5.30	28.0
Chatham	58	14	32.4	3.46	26.9
Cheboygan	67	16	34.2	2.95	5.0
Clinton	70	15	38.6	4.36	8.5
Coldwater	67	10	38.7	5.48	7.0
Deerpark	63	8	31.5	2.63	18.2

TABLE II.—*Climatological record of voluntary and other cooperating observers.*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Michigan—Cont'd.					
Detour	58	14	32.6	2.04	13.5
Dundee	67	21	41.4	3.69	1.0
Eagle Harbor	63	12	32.2	2.13	12.5
East Tawas [c]	74	11	34.6	......	......
Eloise	67	14	39.0	3.54	3.7
Fairview	62	14	35.4	4.21	10.5
Fitchburg	68	11	36.8	4.94	14.0
Flint	66	9	37.0	4.40	13.0
Gaylord	63	10	30.0	4.83	14.0
Gladwin	65	14	34.8	1.45	2.5
Grand Rapids	70	14	37.8	4.91	8.0
Grape	66	13	39.2	3.53	2.3
Grayling	69	12	35.0	5.75	19.5
Hanover	73	11	37.8	5.62	10.3
Harbor Beach	65	10	38.0	3.99	4.0
Harrison	65	12	32.9	2.77	2.5
Harrisville	62	10	35.8	3.01	3.7
Hart	61	15	35.4	3.25	7.5
Hastings	65	2	36.4	5.22	18.3
Hayes	69	20	36.9	3.95	5.0
Highland Station	......	......	......	4.21	10.2
Hillsdale	67	13	37.6	4.80	7.5
Humboldt	71	− 8[d]	19.4[d]	0.20	1.0
Iron River	57	− 2	23.9	2.02	12.0
Ishpeming	40[e]	6	23.6[e]	1.25	10.0
Ivan	60	10	31.6	2.44	11.5
Jackson	68	17	38.6	3.69	5.1
Jeddo	66	13	37.6	3.74	7.1
Kalamazoo	68	12	37.6	4.94	10.5
Lake City	72	9	32.6	3.05	10.0
Lansing	65	12	36.7	3.88	11.0
Lapeer	67	11	36.8	......	......
Lathrop	60	6	28.3	1.73	9.7
Lincoln	64	12	34.2	1.85	1.5
Ludington	76	24	42.0	3.64	10.4
Mackinac Island	64	17	33.6	3.28	16.0
Mackinaw	64	20	34.7	3.78	7.0
Madison	66	14	39.9	4.22	4.4
Mancelona	65	12	32.6	5.36	20.5
Manistee	64	15	36.8	2.52	13.5
Manistique	63	10	31.2	1.60	8.7
Menominee	65	7	32.8	1.51	4.0
Middle Island *[10]	60	21	38.0	......	......
Midland	71	10	37.6	1.31	2.8
Mottville	67	2	37.2	5.85	18.5
Mount Clemens [c]	74	18	42.1	2.44	......
Mount Pleasant	69	20[c]	36.6[c]	......	......
Muskegon	70	16	38.7	4.61	8.0
Newberry	60	3	27.0	2.27	18.0
Northport	64	19	36.6	3.05	21.0
Old Mission	66	19	35.6	3.88	7.0
Olivet	68	14	37.2	5.25	11.9
Omer	65	10	33.8	2.00	3.1
Ontonagon	55	5	26.8	2.50	16.0
Ovid	71	9	36.8	4.57	11.0
Owosso	70	7	36.4	4.80	8.0
Petoskey	69	20	35.0	4.81	16.0
Plymouth	76	13	38.6	2.71	1.0
Port Austin	65	19	38.8	3.65	1.5
Powers	57	11	29.9	......	......
Reed City	67	10	33.4	4.00	6.0
Roscommon	73	8	34.6	2.60	8.0
Saginaw	67	13	36.8	4.40	12.6
St. Ignace	59	15	33.3	1.84	8.0
St. Johns	65	14	36.6	4.32	9.2
St. Joseph	71	15	39.6	3.86	2.0
Sidnaw	68	3	24.0	......	......
South Haven	75[d]	15[d]	41.8[d]	5.75	3.0
Stanton	76	13	37.6	......	......
Thomaston	62	− 5	26.5	3.40	10.0
Thornville	64	17	38.0	3.06	9.0
Traverse City	72	15	36.8	3.62	7.0
Vassar	75	8	36.7	4.82	6.5
Wasepi	66	9	37.7	5.50	13.5
Waverly	62	6	36.7	4.08	5.3
Westbranch	64	11	34.5	2.97	8.4
Wetmore	57	0	27.6	2.10	15.0
Whitecloud	74	8	35.8	3.25	5.0
Whitefish Point	68	6	32.2	4.95	31.5
Williamson	64	9	37.2	3.10	5.5
Ypsilanti	67	12	37.5	3.87	5.9
Minnesota.					
Ada	57	−20	19.5	0.94	2.3
Albert Lea	64	− 1	26.3	......	......
Alexandria	62	− 7	25.0	0.63	5.8
Ashby	63	− 7	24.2	0.48	5.0
Beaulieu	58	− 7	22.8	0.32	4.0
Bemidji	57	−13	23.6	1.09	......
Bird Island	68	0	26.6	0.80	8.5
Blooming Prairie	61	− 2	27.4	0.20	2.0
Brainerd	65	− 6	24.0	0.65	6.5
Caledonia	63	− 2	28.6	1.77	6.5
Collegeville	65	2	27.6	0.41	6.4
Crookston	54	−17	21.0	0.45	5.0
Currie [c]	69	− 1	27.8	......	......
Deephaven	......	......	......	0.70	7.0
Minnesota—Cont'd.					
Detroit City	58	−14	21.0	0.39	3.5
Faribault	63	5	27.9	0.28	4.3
Farmington	62	2	27.4	0.55	5.5
Fergus Falls	62	− 9	23.0	0.70	6.4
Glencoe	64	− 4	25.4	0.26	4.0
Grand Meadow	62	− 7	26.5	0.65	7.8
Hallock	52	−26	17.2	1.02	11.0
Lake Jennie	69	− 5	28.1	0.60	......
Lakeside	65	− 7	26.0	0.45	4.5
Lake Winnibigoshish	60	−12	22.6	0.61	7.8
Leech [1]	52	10*	27.0	0.60	5.0
Leroy	......	− 5	......	1.42	......
Long Prairie	63	− 6	24.6	0.78	6.5
Luverne	64	3	28.6	0.51	6.0
Mapleplain	63	2	27.6	0.89	8.1
Milaca	66	− 2	25.8	0.47	4.8
Milan	72	−14	25.1	1.00	10.0
Minneapolis *a*	61	7	27.4	0.73	7.0
Minneapolis *b* [1]	61*	6	27.6	0.66	5.8
Morris	66	−12	24.5	0.69	5.8
Mount Iron	60	− 8	20.8	0.40	4.0
Newfolden	58	−25	19.2	0.76	7.9
New London	70	−10	25.4	0.30	5.0
New Richland *[1]	62	2	29.2	......	......
New Ulm	70	4	28.0	0.43	4.5
Park Rapids	57	−12	22.0	0.73	7.2
Pine River	58	− 6	24.0	0.47	5.4
Pipestone	65	− 2	26.0	0.21	2.4
Pleasant Mounds	68	1	30.4	0.42	4.5
Pokegama Falls	61	−17	22.7	0.78	8.3
Redwing	......	......	......	1.33	0.2
Reeds	......	......	......	1.19	4.0
Rolling Green	64	0	27.7	0.50	5.0
St. Charles	63	2	28.7	0.65	3.0
St. Cloud	69	0	28.2	0.58	4.0
St. Peter	68	4	29.1	0.20	3.2
Sandy Lake Dam	62	− 7	23.6	0.48	5.8
Shakopee	63	2	27.8	0.66	6.2
Tower	58	−13	23.0	0.70	7.0
Two Harbors	62	− 7	24.6	0.41	2.0
Wabasha *[1]	63	9	29.6	0.78	6.0
White Bear	60	9	28.4	0.78	7.8
Willmar	58	−10	25.2	0.81	8.5
Willow River	65	− 4	25.8	0.46	5.0
Winnebago City	65	2	27.7	0.52	3.8
Worthington	67	0	28.6	0.71	6.8
Zumbrota [1]	62*	2	28.6	......	......
Mississippi.					
Agricultural College	81	28	56.1	1.18	
Austin	79	25	53.2	6.24	
Batesville	80	24	50.1	4.80	
Bay St. Louis	79	33	60.4	0.71	
Biloxi	85	35	55.4	1.92	
Booneville	75	26	51.2	6.41	
Brookhaven	84	25	58.1	1.80	
Canton	85	28	57.0	2.59	
Columbus *a*	......	......	......	2.99	
Columbus *b*	90	29	54.4	2.99	
Corinth	76	25	48.4	5.92	
Crystalsprings	87	27	58.1	2.37	
Edwards	83	30	57.6	2.40	
Fayette	82	30	58.0	4.65	
Fayette (near) *[1]	82	34	58.9	3.07	
Greenville *a*	76	35	55.8	3.38	
Greenville *b*	81	31	56.5	3.30	
Greenwood	81	30	56.7	2.70	
Hernando	80	27	52.9	4.42	
Holly Springs	76	27	51.8	2.45	T.
Jackson	83	21	55.2	2.68	
Kosciusko	86	28	55.4	3.00	
Latonia	84	30	60.5	3.02	
Leakesville	81	27	57.7	1.84	
Logtown	82	30	60.7	0.93	
Louisville	83	27	55.0	1.12	
Macon	83	27	56.0	2.40	
Magnolia	84	28	59.8	0.96	
Natchez	87	30	60.0	8.15	
Okolona	80	27	53.0	2.86	
Palo Alto	82	29	55.2	1.18	
Pontotoc	79	26	53.3	3.48	
Port Gibson	87	26	58.8	3.83	
Ripley	77	25	52.4	3.24	T.
Saratoga	84	26	57.6	2.91	
Shoccoe	......	......	......	1.20	
Stonington *[1]	84	30	57.8	......	
Thornton	......	......	......	3.01	
Tupelo	......	......	......	3.83	
Walnutgrove	81[c]	28[c]	58.1[c]	1.81	
Watervalley	......	......	......	3.97	
Waynesboro	82	29	58.6	0.90	
Woodville	81	31	58.4	1.71	
Yazoo City	86	28	57.1	2.85	
Missouri.					
Appleton City	76	20	45.2	1.60	
Arthur	72	18	42.9	1.35	
Avalon	70	18	40.6	1.37	T.
Missouri—Cont'd.					
Bethany	70	10	38.4	1.34	1.2
Birchtree	79	20	47.2	5.07	
Boonville	......	......	......	5.11	T.
Brunswick	70	19	39.8	1.41	
Carrollton	71	20	42.0	1.55	T.
Conception	68	15	40.5	0.93	T.
Cook Station	84	8	45.8	4.20	T.
Cowgill *[5]	70	18	41.4	2.79	
Darksville	69	17	39.3	1.25	0.5
Downing	......	......	......	1.71	T.
East Lynne *[3]	......	20	39.4	1.63	T.
Edgehill *[5]	72	18	42.7	4.80	
Edwards	78	19	47.0	2.41	T.
Eldon	79	17	45.1	2.37	T.
Elmira	71	16	40.2	1.15	T.
Fairport	......	......	......	1.42	1.0
Fayette	73	17	42.0	1.79	0.5
Fulton	75	20	43.8	1.47	T.
Galena	......	......	......	4.35	T.
Gallatin *[1]	72	16	40.8	1.42	0.5
Gayoso	74	23	49.2	8.32	T.
Glasgow	70	18	41.4	1.45	
Gorin	......	......	......	2.23	1.5
Halfway	78	19	47.9	2.77	T.
Harrisonville	73	16	41.4	1.64	
Hazlehurst	......	......	......	1.46	0.5
Hermann	......	......	......	1.76	T.
Houston	83	19	48.2	4.77	T.
Houstonia (near)	......	......	......	1.74	0.5
Irena	......	......	......	0.84	0.5
Ironton	81	13	45.6	5.21	T.
Jackson *[3]	76	21	44.0	5.96	T.
Kidder	71	15	39.1	1.14	0.7
Koshkonong	80	23	50.0	5.05	T.
Lamar	78	22	47.4	2.50	
Lamonte	......	......	......	1.32	T.
Lebanon	77	19	47.4	3.52	
Lexington	75	19	42.4	1.69	
Liberty	71	16	40.0	1.96	T.
Louisiana	78	16	44.7	1.53	T.
McCune *[1]	73	16	43.0	1.47	0.5
Macon	72	15	40.8	1.24	1.0
Marblehill	78	15	46.6	5.83	
Marshall	71	15	40.2	1.20	T.
Maryville	71	7	35.5	1.27	2.0
Mexico	74	19	44.1	1.34	T.
Miami *[5]	68	20	41.0	1.54	T.
Mineralspring	78	23	50.0	4.30	T.
Montreal	75	17	46.2	1.79	T.
Mount Vernon	72	22	48.8	4.68	T.
Neosho	78	16	48.0	3.13	T.
Nevada	......	......	......	1.36	
New Haven	80	20	45.6	2.28	
New Madrid	70[d]	21[d]	46.4[d]	8.76	T.
New Palestine	73	19	44.2	1.49	
Oakfield	80	17	46.6	3.07	
Olden	80	18	45.4	4.27	T.
Oregon *a*	73	10	39.2	1.31	2.3
Oregon *b*	79	13	41.4	1.13	2.0
Palmyra *[5]	70	18	40.5	1.32	2.0
Phillipsburg *[1]	76	19	44.6	3.29	
Pine Hill	......	......	......	4.89	T.
Poplarbluff	80	19	49.9	3.97	
Potosi	83	10	46.4	4.38	T.
Princeton	72	15	39.2	2.50	0.5
Richmond	72	20	42.4	1.96	T.
Rockport	......	......	......	0.20	2.0
Rolla	......	......	......	3.33	
St. Charles	77	19	45.8	1.85	
St. Joseph	......	......	......	2.00	1.5
Sarcoxie *[3]	......	22	41.8	3.47	T.
Sedalia	78	18	42.2	1.54	T.
Seymour	80	20	47.4	6.35	T.
Shelbina	......	......	......	1.70	
Sikeston	76	19	48.0	4.91	T.
Steffenville	68	17	40.6	1.25	1.0
Sublett	68	15	39.6	1.42	T.
Trenton	67	18	39.4	1.25	T.
Unionville	70	15	38.4	1.73	0.2
Vichy	80	18	47.0	3.64	T.
Warrensburg	73	19	42.4	1.33	
Warrenton	76	18	43.4	2.07	T.
Wheatland	......	......	......	2.84	T.
Willowsprings	78	12	44.2	6.24	T.
Windsor	73	18	43.4	1.71	T.
Wylie	81	18	50.2	3.12	T.
Zeitonia	82	17	50.7	4.51	
Montana.					
Augusta	67	−28	29.8	1.60	11.2
Boulder	62	−22	26.5	0.10	1.5
Butte	56	−10	33.7	0.20	2.0
Canyon Ferry	61	......	......	0.17	4.0
Clemons	65	−28	29.0	0.75	7.5
Columbia Falls	47	−15	27.6	1.59	7.4
Corvallis	60	−22	32.0	0.70	7.0
Crow Agency	72	− 7	30.4	0.50	5.0

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
Montana—Cont'd.					
Dell	60	−20	26.2	0.60	6.0
Dillon	61	−20	31.2	1.15	11.5
Ekalaka	63	−7	29.2	0.30	3.0
Fort Logan	60	−20	27.8	0.36	......
Glasgow	59	−25	17.6	0.78	......
Glendive	60	−20	23.4	0.85	8.0
Glenwood	61	−21	28.8	0.53	......
Greatfalls	65	−19	31.6	1.44	14.4
Kipp	60	−21	25.1	1.25	12.5
Lewistown	66	−25	29.8	0.32	3.0
Livingston	64	−11	34.5	0.03	0.3
Manhattan	65	−17	28.4	0.10	1.0
Martinsdale	62	−18	30.4	0.40	4.0
Marysville	57	−24	27.8	0.97	8.8
Missoula	59	−11	29.0	1.05	6.0
Ovando	59	−26	23.2	1.69	11.9
Parrot	62	−12	32.0	0.16	1.5
Plains	53	−13	31.0	1.28	6.0
Poplar	55	−24	21.0	0.90	9.0
Ridgelawn	55	−25	20.6	0.65	4.5
St. Pauls	......	−20	......	0.45	3.5
Troy	54	−8	31.2	2.60	11.0
Twin Bridges	62	−16	28.2	......	......
Utica	67	−24	29.4	0.29	......
Wibaux	52	−20	27.2	0.10	1.0
Yale	67	−19	29.7	0.25	2.5
Nebraska.					
Agate	......	......	......	0.11	1.5
Agee	......	......	......	0.18	3.0
Alliance	......	......	......	T.	T.
Alma	80	0	37.0	0.40	4.0
Ansley	80	−9	34.4	0.20	2.0
Arapaho*[1]	72	12	38.6	0.10	1.0
Arborville*[1]	70	8	34.0	0.05	0.5
Arcadia	76	4	34.0	0.45	4.5
Arlington	......	......	......	0.30	0.5
Ashland *a*	73	8	36.8	T.	T.
Ashland *b*	......	......	......	T.	T.
Ashton	......	......	......	0.22	3.0
Auburn	72	4	39.2	0.25	1.5
Aurora*[1]	77	11	35.3	0.13	1.0
Bartley	......	......	......	T.	
Beatrice	73	4	37.2	0.12	0.5
Beaver	82	6	39.8	0.20	2.0
Bellevue	......	......	......	0.14	1.1
Benedict	......	......	......	T.	
Benkleman	......	......	......	0.15	1.5
Blair	70	8	34.7	0.23	1.4
Bluehill	......	......	......	0.08	0.5
Bradshaw	......	......	......	0.05	0.5
Brokenbow*[1]	68	4	32.6	0.32	0.8
Burchard	......	......	......	0.02	0.2
Burwell	......	......	......	0.25	2.5
Callaway	71	8	40.0	0.50	4.0
Camp Clarke	......	......	......	0.08	0.8
Central City	......	......	......	T.	T.
Chester	......	......	......	0.13	
Cody	......	......	......	0.10	1.0
Columbus	72	8	35.4	0.03	
Crete	65	8	36.6	0.01	T.
Culbertson	......	......	......	0.15	0.5
Curtis*	80	12	43.6	0.20	2.0
David City	72	10	35.1	0.40	1.0
Dawson	72	4	40.1	0.43	2.5
Eden	......	......	......	0.20	1.5
Edgar *a*	......	......	......	T.	T.
Ericson	......	......	......	0.20	2.0
Ewing	......	......	......	0.30	3.0
Fairbury	75	5	37.2	0.05	1.0
Fairmont	66	10	35.7	0.10	1.0
Fort Robinson	74	−9	35.6	0.15	2.8
Franklin	80	−1	36.8	0.60	6.0
Fremont	72	12	36.2	0.13	T.
Geneva	76	11	36.8	T.	T.
Genoa	72	5	35.2	0.22	2.2
Gering	73	4	35.8	0.06	0.6
Gosper	......	......	......	T.	T.
Gothenburg	83	2	38.0	0.03	0.3
Grand Island *a**[1]	83	16	36.2	0.16	......
Grand Island *b*	77	6	37.9	0.22	2.2
Greeley	......	......	......	0.07	0.7
Guide Rock	......	......	......	0.30	3.0
Haigler	......	......	......	0.05	0.5
Hartington	72	−1	30.2	0.27	1.1
Harvard	72	7	35.5	0.10	1.0
Hastings*[1]	78	12	35.6	0.04	1.0
Hayes Center	......	......	......	0.15	1.5
Hay Springs	71	−2	34.8	T.	T.
Hebron	75	9	38.3	0.07	0.5
Hickman	......	......	......	0.08	0.5
Holdrege	......	......	......	0.35	3.5
Hooper*[1]	67	9	33.7	0.12	1.2
Imperial	80	−5	37.0	0.22	1.0
Kearney	......	......	......	T.	T.
Kimball	71	1	36.8	0.20	2.0
Kirkwood*[1]	74	6	31.3	0.10	1.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
Nebraska—Cont'd.					
Laclede	76	6	35.0	0.15	1.0
Lena	......	......	......	0.10	1.5
Lexington	79	0	35.1	0.20	2.0
Lincoln [d]	74	10	37.6	0.11	0.2
Lodgepole	76	4	35.4	0.10	1.0
Loup	......	......	......	0.20	3.0
Lynch	79	−5	34.4	0.10	1.0
Lyons	......	......	......	0.25	0.7
McCook*[1]	70	16	37.4	T.	T.
Madison	72	4	34.4	0.25	2.2
Madrid*[5]	60	10	33.4	0.00	
Marquette	......	......	......	0.15	1.5
Mason City	......	......	......	0.20	2.0
Merriman	......	......	......	T.	T.
Minden *a*	77	2	35.5	0.97	5.0
Monroe	......	......	......	0.11	0.8
Nebraska City *b*	......	......	......	0.05	0.5
Nebraska City *c*	69	16	37.9	0.15	......
Nesbit	73	0	34.8	0.05	1.0
Norfolk	72	1	32.6	0.17	2.2
North Loup	80	2	36.1	0.25	2.5
Oakdale	72	−4	32.4	0.20	1.9
Odell	64	6	36.6	0.20	1.5
O'Neill	74	4	33.0	0.20	2.0
Ord	......	......	......	0.13	4.5
Osceola	......	......	......	0.15	1.5
Ough	......	......	......	0.15	1.5
Palmer*[5]	72	8	37.8	0.10	1.0
Palmyra*[1]	70	8	34.8	0.20	
Plattsmouth *b*	......	......	......	0.51	
Pleasanthill	......	......	......	0.35	T.
Ravenna *a*	78	1	36.0	0.30	3.0
Ravenna *b*	......	......	......	0.12	1.2
Redcloud *b**[1]	67	4	35.2	0.30	3.0
Republican*[1]	74	0	33.8	0.30	3.0
Rulo	......	......	......	0.25	......
St. Libory	......	......	......	0.42	1.0
St. Paul	80	−2	34.5	0.16	1.5
Salem*[1]	72	8	37.9	0.36	2.5
Santee	74	1	34.4	0.24	2.7
Sargent	......	......	......	0.41	4.0
Schuyler	......	......	......	0.10	......
Seneca*[1]	56	8	31.8	T.	
Seward	......	......	......	0.02	0.1
Smithfield	......	......	......	0.00	
Spragg	......	......	......	0.20	2.0
Springview	75	−5	34.3	T.	T.
Stanton*[1]	78	1	32.8	0.07	0.
State Farm	75	9	37.8	0.07	
Strang	......	......	......	0.10	1.0
Stratton	......	......	......	0.30	1.0
Superior*[5]	72	8	42.1	0.20	2.0
Syracuse	......	......	......	0.55	1.0
Tablerock	......	......	......	0.38	2.0
Tecumseh *b*	72	4	40.8	0.45	......
Tecumseh *c*	......	......	......	0.16	1.5
Tekamah	75	7	36.6	0.23	2.0
Turlington	73	6	36.5	0.08	0.5
Wakefield	73	0	34.1	0.29	2.2
Wallace	......	......	......	0.10	1.0
Wauneta	......	......	......	0.10	1.0
Weeping Water*[1]	71	3	32.3	0.12	1.0
Westpoint	74	7	36.4	0.10	1.0
Whitman	......	......	......	T.	T.
Wilber*[1]	70	8	36.6	0.10	
Willard	......	......	......	0.10	1.0
Wilsonville*[1]	70	8	36.9	0.05	0.5
Winnebago	......	......	......	0.01	0.1
Wisner	......	......	......	0.27	2.0
Wymore	......	......	......	0.18	2.0
York	78	10	38.3	0.08	0.2
Nevada.					
Austin	62	20	41.4	0.86	
Battle Mountain*[1]	70	24	41.1	......	
Belmont	62	20	39.2	0.90	2.0
Beowawe*[1]	69	30	42.9	0.65	4.5
Candelaria	78	21	47.0	0.25	T.
Carlin*[1]	65	20	35.9	0.80	5.0
Carson City	69	22	42.7	2.41	4.5
Clover Valley	60	15	37.8	2.32	7.0
Cranes Ranch	......	......	......	1.70	......
Duck Valley	68	1	38.6	1.50	13.6
Elko*[1]	62	19	36.0	1.88	7.0
Elko (near)	62	12	40.2	3.53	12.0
Ely	63	14	37.2	0.61	4.0
Empire Ranch	70	15	39.2	0.05	0.1
Fenelon	......	......	......	0.75	7.5
Golconda*[1]	62	28	42.2	1.88	7.5
Halleck*[1]	68	19	37.5	0.65	4.0
Hamilton	69[d]	9	36.9	1.70	0.9
Hawthorne	78	22	45.0	0.12	
Hot Springs*[1]	65	22	41.8	T.	
Humboldt*[1]	66	25	39.9	0.78	1.5
Lee	......	......	......	2.99	13.0
Lewers Ranch	70	19	44.1	6.68	11.0
Lovelocks*[1]	67	29	45.2	0.60	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
Nevada—Cont'd.					
Martins	68	......	......	1.43	T.
Mill City*[1]	66	28	41.2	1.05	3.5
Palisade*[1]	65	20	40.0	0.75	6.0
Palmetto	72	13	41.6	1.15	4.0
Reno State University	69	24	43.6	1.48	2.5
Silverpeak	69	12	43.5	0.03	T.
Sodaville	65	17	40.2	0.18	
Tecoma	......	......	......	0.60	6.0
Toano*[1]	72	18	42.7	1.39	7.0
Tybo	62	22	39.8	2.05	
Verdi*[1]	74	20	45.2	2.75	21.0
Wadsworth	......	......	......	0.50	3.5
Wells*[1]	62	20	39.2	1.50	4.0
New Hampshire.					
Alstead	......	......	......	7.29	7.8
Berlin Mills	68	−1	35.0	6.72	18.5
Bethlehem	65	5	35.4	5.77	18.0
Brookline*[1]	66	8	40.0	6.88	2.2
Claremont	63	9	38.8	6.28	7.0
Concord	67	8	39.2	5.22	5.6
Durham	70	17	40.6	5.04	2.8
Grafton	67	4	36.8	5.37	7.0
Hanover	63	6	37.5	5.15	5.8
Keene	66	7	38.2	5.68	6.2
Littleton	65	3	34.6	......	15.0
Nashua	70	11	41.4	5.50	3.0
Newton	71	11	39.8	5.13	T.
North Conway	72	7	36.8	7.70	4.0
Peterboro	66	8	37.8	7.12	7.4
Plymouth	65	10	36.8	6.15	5.0
Sanbornton	65	9	37.4	5.28	8.0
Stratford	65	0	35.2	5.82	23.0
New Jersey.					
Asbury Park	75	26	50.0	3.67	
Bayonne	74	24	48.0	4.67	
Belvidere	72	20	44.4	2.37	T.
Bergen Point	73	27	48.0	5.04	
Beverly	76	21	48.0	3.08	
Billingsport*[1]	75	28	48.3	3.13	
Bridgeton	76	23	50.2	2.85	
Camden	74	26	48.0	3.10	
Cape May C. H.	76	23	50.7	1.82	
Charlotteburg	71	16	44.0	3.85	T.
Chester	69	20	43.0	2.84	T.
Clayton	76	20	48.1	2.83	
College Farm	74	23	47.4	4.27	
Deckertown	71	19	43.8	3.13	T.
Dover	69	22	43.8[b]	3.02	
Egg Harbor City	74	19	48.2	3.52	
Elizabeth	74	24	46.9	5.33	
Flemington	79	21	46.6	2.75	
Freehold	73	23	46.8	3.78	T.
Friesburg	76	23	49.4	2.96	T.
Hammonton	......	......	......	3.17	
Hightstown	74	26	47.8	4.23	
Imlaystown	76	24	49.6	4.05	T.
Lambertville	78	22	47.0	2.60	T.
Layton	72	15	42.3	2.41	T.
Moorestown	75	23	48.8	3.30	T.
Mount Pleasant	......	......	......	2.88	
Newark	73	23	46.1	4.68	T.
New Brunswick	73	23	48.1	4.22	T.
Newton	72	20	43.8	2.98	T.
Ocean City	73	19	48.6	2.68	
Oceanic	75	24	48.0	4.02	
Paterson	73	25	48.4	4.77	T.
Perth Amboy	74	28	47.6	4.54	
Plainfield	73	21	45.6	3.80	T.
Rancocas	......	......	......	3.00	T.
Rivervale	73	17	45.0	5.54	T.
Roseland	73	19	44.3	3.61	T.
Salem	79	23	50.2	1.96	T.
Somerville	74	21	46.9	3.50	T.
South Orange	72	24	45.6	3.68	
Toms River	78	15	47.8	3.47	T.
Trenton	73	28	49.8	4.41	T.
Tuckerton	73	19	49.4	3.74	
Vineland	76	22	49.7	2.55	
Woodbine	73	19	50.5	1.31	
New Mexico.					
Albert	80	21	50.2	0.00	
Albuquerque	63	24	44.7	0.83	T.
Alma	77	20	46.7	1.24	
Aztec	67	15	39.6	1.15	5.0
Bellranch	......	......	......	0.37	
Bernalillo	72	22	46.4	0.39	T.
Bluewater	64	12	43.5	0.60	6.0
Cambray	......	......	......	0.45	
Deming	......	......	......	0.04	
East Lasvegas	62	24	42.6	0.30	T.
Engle	74	16	47.2	0.00	
Espanola	70	16	41.7	0.30	1.0
Folsom	72	11	40.8	0.05	0.5
Fort Bayard	72	26	47.8	0.85	
Fort Stanton	73	15	46.1	0.40	3.2
Fort Union	80	10	43.4	0.20	2.0

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Temperature. (Fahrenheit.) Minimum.	Temperature. (Fahrenheit.) Mean.	Precipitation. Rain and melted snow.	Precipitation. Total depth of snow.
New Mexico—Cont'd.	°	°	°	*Ins.*	*Ins.*
Fort Wingate	80	18	44.6	0.89	5.5
Gage				0.63	
Galisteo	75	19	42.4	0.10	1.0
Gallinas Spring	70	24	45.3	0.52	
Las Vegas Hotsprings	70	18	43.2	1.02	T.
Lordsburg				0.45	
Los Lunas	72	17	41.6	0.35	
Lower Penasco	74	10	50.0	T.	
Lyons Ranch	79	25	49.8	1.40	
Mesilla Park	80	20	49.7	0.23	
Raton	74	15	43.6	0.00	
Roswell	79	20	49.9	0.17	
San Marcial				0.26	
Socorro	71	18	45.8	0.13	
Springer	79	6	42.6	T.	T.
Strauss				0.18	
Whiteoaks	70	23	45.6	0.30	0.5
Winsors Ranch	67	10	35.9	0.50	7.0
Woodbury	68	21	43.4	0.63	T.
New York.					
Adams				8.51	60.0
Addison	69	19	42.0	6.00	4.0
Akron				6.06	
Alden	68	22	41.4	8.42	32.0
Alfred				4.55	13.2
Angelica	64	11	38.8	5.40	6.0
Appleton	69	24	40.5	4.95	3.7
Atlanta	68	13	38.5	5.89	7.5
Auburn	68	17	41.0	7.52	11.0
Avon	66	19	41.0	3.92	8.0
Axton	63	3	32.2	7.35	41.2
Baldwinsville	68	17	40.4	6.59	5.0
Bedford *a*				5.16	1.0
Bisby Lodge				8.55	24.0
Bolivar	64	13	38.0	6.29	6.0
Bouckville	65	10	36.8	6.08	12.0
Boyds Corners				4.91	
Brockport	65	21	39.2	5.84	18.0
Caldwell	68	12	39.3	5.16	12.6
Canaan Four Corners	63	11	39.0	3.73	10.2
Canajoharie	72	14	38.4	4.23	6.5
Canton	67	−2	35.0	5.47	15.0
Carmel	69	20	37.2	5.26	0.8
Carvers Falls	69	10	38.2	4.41	6.0
Catskill	70	22	42.1	3.08	0.5
Cedarhill	72	18	41.8	3.41	1.3
Charlotte*[10]	61	17	37.0		
Chenango Forks				4.80	3.0
Cooperstown	66	12	37.7	4.62	8.0
Cortland	65	17	40.2	7.17	
Cutchogue	69	23	46.6	5.64	T.
Dekalb Junction				7.33	25.0
Easton				3.86	6.0
Elba	75	17	39.8	3.99	12.5
Elmira	66	25	42.6	5.09	
Fleming	65	22	40.9		
Franklinville	65	17	38.4	5.60	9.0
Fulton				4.68	15.6
Gabriels	62	3	31.8	8.84	36.5
Glens Falls	67	14	38.9	5.27	2.8
Gloversville	68	7	35.7	5.26	9.5
Greenwich	67	14	39.3	4.56	6.0
Griffin Corners				3.52	8.1
Haskinville				5.31	4.0
Hemlock	64	23	41.0	3.34	14.0
Honeymead Brook	68	17	40.8	4.12	5.3
Honnedaga Lake				7.21	16.4
Humphrey	69	18	37.2	6.58	19.2
Indian Lake	59	0	35.4	7.16	27.4
Ithaca	68	18	40.6	5.71	3.5
Jamestown	62	22	40.4	7.27	24.0
Jay	68	6	35.8	7.27	37.3
Keene Valley	65	2	35.2	6.95	28.6
King Ferry				5.78	5.8
King Station				5.75	7.5
Liberty	72	15	38.1	5.95	1.0
Littlefalls	69	8	36.7	4.56	10.2
Lockport	67	23	40.3	3.00	11.0
Lowville	66	0	35.6	7.30	28.0
Lyndonville				5.32	
Lyons	66[c]	24[c]	42.0[c]	6.43	6.5
Mayle				5.09	26.0
Meredith	62	13	37.1	3.44	17.0
Middletown	65	22	41.6	3.46	2.0
Mohonk Lake				4.69	0.5
Moira	69	4	36.0	6.22	24.0
Newark Valley				5.54	5.5
New Lisbon	66	6	37.4	3.89	6.2
North Germantown				3.98	T.
North Hammond	64	12	35.4	5.30	16.8
North Lake	60	3	33.6	7.56	18.0
Number Four	62	1	33.8	8.97	44.9
Ogdensburg	67	9	36.8	3.66	9.5
Old Chatham				4.18	7.5
Oneonta	74	13	42.5	2.65	2.8
Oxford	70	11	38.4	5.31	
New York—Cont'd.					
Palermo	65	13	38.4	6.40	18.7
Penn Yan	68	22	41.4	6.04	5.3
Perry City	65	18	39.3	6.58	8.0
Phoenix				7.30	
Plattsburg Barracks	61	10	36.7	8.82	29.3
Port Byron	65	18	39.6	7.34	8.0
Port Jervis	70	19	42.2	3.67	T.
Primrose	71	19	44.9	5.75	T.
Red Hook				4.33	T.
Richmondville				3.74	7.5
Ridgeway	68	22	39.4	5.03	15.9
Rome	60	10	37.8	8.39	
Romulus	68	22	41.4	7.23	5.0
Rose				6.22	8.6
St Johnsville	71	12	39.4	4.98	7.5
Salisbury Mills				3.14	
Saranac Lake	65	1	35.0	4.98	33.0
Saratoga Springs	67	13	39.6	5.16	8.5
Schenectady	68	15	39.4	4.38	3.0
Setauket	69	25	47.6	4.88	
Shortsville	68	22	40.5	4.38	5.7
Skaneateles				7.14	
South Berlin	69	12	41.5	2.50	9.0
South Canisteo	66	15	38.8	6.03	5.8
Southampton	68	20	47.5	3.90	T.
Southeast Reservoir				5.98	
South Kortright	67	8	38.5	2.37	
Straits Corners	67	14	39.2	5.84	4.9
Ticonderoga	65	13	40.0	6.17	13.0
Volusia	65	20	38.6	7.02	21.0
Walton	77	11	40.6	3.11	4.0
Wappingers Falls	72	20	43.6	4.81	1.0
Warwick				3.34	
Watertown	67	−2	37.2	8.70	67.0
Waverly	68	16	41.0	5.20	4.4
Wedgwood	65	18	38.4	6.79	7.0
Wells	60	5	36.4	7.54	15.7
West Berne	70	12	37.4	3.75	16.0
West Chazy	63	7	34.9		
Westfield *a*	68	24	43.0		
Westfield *b*	66	22	41.0	6.22	
Westfield *c*	68	24	44.9	6.53	11.0
Windham	69	10	39.2	4.11	8.5
North Carolina.					
Abshers	83	24	50.0	5.15	T.
Asheville				4.62	T.
Biltmore	80	22	47.5	3.34	T.
Bryson City				4.80	
Chapelhill	82	29	51.8	5.00	
Cherryville	79	25	51.7	4.04	
Currituck				3.22	
Edenton	79	32	55.0	4.45	
Fayetteville	85	28	54.6	3.52	
Flatrock	72	20	47.8	8.87	T.
Goldsboro	79	30	54.4	5.76	
Greensboro	79	29	51.0	2.72	
Henderson	80	27	53.9	5.30	T.
Hendersonville	79	18	50.0	3.47	T.
Henrietta	82	26	52.4	5.27	
Highlands	69	13	45.3	5.03	T.
Horse Cove	72	18	49.6	5.94	T.
Kinston	81	26	55.3	5.57	
Lenoir	83	22	48.8	4.48	T.
Linville	66	15	43.6	4.47	2.0
Littleton	82	23	51.6	4.52	
Louisburg	80	26	51.5	4.96	
Lumberton	78	28	54.2	4.17	
Marion	80	24	51.2	4.04	
Mocksville	80	24	51.2	3.31	
Moncure	80	27	53.0	3.35	
Monroe	80	22	52.0	5.76	
Mountairy	77	23	48.7	3.10	
Murphy				5.22	T.
Newbern	82	29	58.4	3.62	
Oakridge	80	23	50.2	3.05	
Patterson*[1]	76	24	45.5	4.85	T.
Pittsboro	82	23	51.5	4.40	
Rockingham	79	27	53.2	3.48	
Roxboro	79	24	50.8	2.79	T.
Salem	73	25	49.8	3.13	
Salisbury	81	21	52.2	2.10	
Saxon	80	24	50.2	2.76	
Selma	83	28	55.3	4.00	
Settle	80	27	51.6	3.08	
Sloan	86	26	57.0	5.07	
Soapstone Mount	85	22	51.2	3.71	
Southern Pines *a*				4.38	
Southern Pines *b*	79	30	55.8	3.17	
Southport	80	30	60.0	4.76	
Springhope*[1]	80	32	53.6	3.75	
Waynesville	76	16	44.0	3.57	
Weldon *a*	78	29	52.0	4.08	
Weldon *b*				4.27	
North Dakota.					
Amenia	60	−15	19.7	0.80	7.0
Ashley	63	−14	21.4	0.40	4.0
North Dakota—Cont'd.					
Berlin	61	−16	21.0	0.28	2.3
Churchs Ferry	55	−22	17.0	0.40	4.0
Coalharbor	52	−18	19.9	0.33	3.2
Devils Lake	53	−21	17.7	0.56	5.6
Dickinson	53	−14	22.7	0.55	5.5
Donnybrook				0.72	5.0
Ellendale	63	−17	26.0	0.30	2.0
Falconer	56	−21	22.9	0.48	4.5
Fargo	59	−15	20.0	0.20	
Forman	59[c]	−10[c]	23.0[c]	0.20	2.0
Fort Berthold	59	−21	23.6	0.55	5.5
Fort Yates	64	−11	24.2	1.02	10.2
Fullerton	63	−10	22.5	0.41	4.0
Gallatin	55	−17	18.6	0.79	7.9
Glenullin	57	−12	21.7	1.05	11.5
Grafton	56	−14	19.1	0.57	5.7
Hamilton	53	−6	18.1	0.67	6.7
Hannaford	56	−20	18.6	0.39	3.9
Jamestown	63	−14	21.2	0.60	5.5
McKinney	53	−29	17.6	0.46	4.6
Mayville	56	−11	22.6	0.70	7.0
Medora	56	−15[j]	24.4[c]	0.30	3.0
Melville	54	−22	20.6	0.35	
Milton	56	−18	16.2		
Minnewaukon	54	−21	17.4	0.27	3.3
Minto	54	−16	16.8	0.47	
Napoleon	54	−16	20.7	0.95	10.0
New England	56	−15	22.3		
Oakdale	55	−11	24.6	0.77	7.5
Pembina	52	−17	16.9	1.02	10.2
Portal	51[h]	−23[h]	17.8[h]		
Power	64	−11	22.7	0.46	4.6
Steele	58	−16	18.4	0.17	1.7
Towner	57	−24	16.2	0.80	8.0
University	55	−12	22.1	0.90	8.0
Wahpeton	63	−11	22.6	0.30	3.0
Willow City	56	−25	18.6		
Woodbridge	51	−22	15.4	0.75	7.5
Ohio.					
Akron	66	12	40.2	3.86	11.0
Annapolis	73	12	42.4	3.72	
Ashland	69	9	40.2	3.23	9.3
Ashtabula	66	22	42.4	5.50	9.0
Atwater				4.13	6.5
Bangorville	77	9	39.7	3.43	6.0
Bellefontaine	67	15	39.2	2.75	3.0
Benton Ridge	68	9	40.9	3.66	6.5
Bethany	70	14	43.0	4.47	2.0
Bigprairie	67	8	41.7	2.49	2.5
Binola				4.19	6.0
Bladensburg	70	1	40.1	3.29	2.2
Bloomingburg	73	15	42.4	4.13	4.0
Bowling Green	68	8	40.4	3.82	6.5
Bucyrus	80	4	40.0	1.03	T.
Cambridge				4.03	T.
Camp Dennison	75	14	44.5	5.49	5.0
Canal Dover	68	7	40.8	3.82	2.0
Canton	68	11	41.6	4.10	6.0
Cardington	68	5	40.0	3.79	2.6
Cedarville				4.93	6.5
Celina	70[c]	10[c]	41.6[c]	2.43	T.
Circleville	71	13	41.6	5.64	4.0
Clarksville	75	12	43.2	5.37	9.3
Cleveland *a*	65	20	42.6	4.18	11.9
Cleveland *b*	67	18	41.2	2.87	6.0
Coalton	75	9	44.6	6.36	3.0
Colebrook	76[h]	12[h]	41.8[h]	3.81	8.0
Dayton *a*				3.13	T.
Dayton *b*	74	12	43.0	3.60	2.5
Defiance	78	6	40.7	3.76	5.6
Delaware	68	6	40.7	3.77	3.5
Demos	72	16	40.8	3.48	2.0
Elyria	72[j]	14[j]	42.7[j]	3.08	5.6
Findlay	80	10	41.8	3.10	3.0
Frankfort	76	11	44.0	5.80	3.5
Garrettsville	65	15	40.0	4.47	10.5
Granville	69	10	40.2	3.79	0.5
Gratiot	73	9	41.6	4.33	3.4
Green	80	15	45.8	6.38	1.5
Greenfield	70	17	43.2	5.57	5.0
Greenhill	69	2	39.6	3.76	7.0
Greenville	71	14	41.2	3.52	0.5
Hanging Rock	71	15	45.6	7.25	6.0
Hedges	74	5	41.4	4.10	6.0
Hillhouse	70	16	39.6	3.82	11.0
Hillsboro	77	10	42.7	5.80	4.5
Hiram	64	14	40.4	4.80	14.0
Hudson	65	10	39.6	4.43	8.0
Jacksonboro	72	18	42.2	2.75	4.0
Kenton	70	14	42.2	4.66	4.3
Killbuck	69	10	40.8	4.19	3.5
Lancaster	72	10	43.4	4.64	4.0
McConnelsville	76	10	42.7	5.56	2.5
Mansfield				4.63	6.0
Marietta	78	16	37.5	5.46	T.
Marion	69	11	41.4	3.45	0.9

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Medina	70	9	40.8	4.00	9.0
Milfordton	79	7	39.6	3.42	5.0
Milligan	73	6	41.6	4.06	4.0
Millport	69	0	39.9	4.22	4.0
Montpelier	66	10	39.0	3.92	7.5
Napoleon	70	11	41.0	3.61	6.5
New Alexandria	70	14	43.0	4.00	3.0
New Berlin	66	7	40.2	3.70	2.0
New Bremen	71	10	41.6	4.22	1.0
New Holland	70	12	42.8	3.52	4.5
New Paris	74	15	40.6	3.75	T.
New Richmond	74	19	45.4	5.78	5.5
New Waterford	68	12	40.4	5.71	11.0
North Lewisburg	69	10	39.6	4.45	7.0
North Royalton	66	13	39.8	3.72	5.4
Norwalk	68	8	40.9	4.31	5.0
Oberlin	69	10	40.0	3.04	......
Ohio State University	72	11	41.5	3.28	8.0
Orangeville	70	13	40.0	3.27	8.5
Ottawa	70	9	41.4	3.37	4.5
Pataskala	69	9	41.1	4.45	5.5
Perry	......	......	......	4.87	6.0
Philo	74	12	41.7	2.36	3.2
Plattsburg	70	12	41.1	4.88	8.0
Pomeroy	75	13	45.6	6.34	T.
Portsmouth *a*	......	......	......	7.95	3.0
Portsmouth *b*	77	15	46.3	6.61	3.0
Pulse	......	......	......	5.58	8.0
Richwood	69	16	41.3	3.82	3.0
Ripley	75	15	44.7	6.60	8.0
Rittman	68	6	41.0	6.74	9.0
Rockyridge	68	12	41.0	3.52	2.0
Rosewood	69	12	41.0	3.54	1.5
Shenandoah	72	5	40.0	2.97	6.8
Sidney	80	12	41.0	3.08	2.5
Sinking Spring	71	16	44.0	5.95	11.0
Somerset	72	16	44.2	4.28	1.5
Springboro	......	......	......	3.53	2.0
Springfield	......	......	......	3.50	3.1
Strongsville	......	......	......	4.91	0.5
Swanton	......	......	......	3.32	1.0
Thurman	75	11	45.4	7.28	2.0
Tiffin	74	12	41.6	2.90	5.0
Upper Sandusky	70	9	40.4	2.57	3.0
Urbana	68	13	40.4	3.68	4.7
Vanwert	74	12	40.6	3.37	3.5
Vermillion	67	13	40.7	3.31	6.5
Vickery	68	10	41.2	2.58	2.9
Walnut	......	......	......	4.16	4.6
Warren	68	18	41.6	5.80	5.5
Warsaw	71	5	40.2	3.62	T.
Wauseon	67	9	39.6	4.48	8.9
Waverly	75	13	44.4	6.42	3.0
Waynesville	71	15	41.5	3.63	5.5
Wellington	65	14	40.6	3.00	......
Westerville	68	13	42.4	4.06	5.9
Willoughby	......	......	......	4.49	4.0
Wooster	69	6	40.6	4.30	2.5
Youngstown	......	......	......	3.74	......
Zanesville	......	......	......	4.19	1.1
Oklahoma.					
Arapaho	80	22	48.4	0.13	T.
Beaver *c*	71	22	44.0	0.00	
Blackburn	76	20	47.0	1.55	T.
Burnett	82	20	51.1	1.85	
Clifton	83	19	52.0	2.06	
Fort Reno	80	17	47.2	0.63	
Fort Sill	80	23	49.6	1.45	
Hennessey	80	24	49.0	0.30	T.
Jefferson	78	21	44.4	T.	T.
Jenkins	77	23	46.8	0.15	T.
Kenton	76	14	44.7	T.	T.
Kingfisher	80	25	49.6	0.50	T.
Mangum	82	16	52.4	0.20	
Newkirk	70	25	46.6	0.09	T.
Norman	79	25	50.4	2.87	T.
Pawhuska	76	20	47.8	0.82	
Perry	77	27	49.1	1.05	T.
Poarch	83	18	48.8	0.06	
Sac and Fox Agency	80	20	49.5	1.53	T.
Stillwater	78	27	49.5	0.65	
Taloga	80	......	......	0.10	T.
Texmo	79	22	52.4	0.00	
Vittum	75	28	50.0	1.14	
Waukomis	79	24	48.7	0.20	T.
Woodward	78	21	48.0	T.	T.
Oregon.					
Albany *a* *[1]	65	26	47.4	3.29	......
Albany *b*	......	......	......	4.37	T
Alpha	68	19	47.7	10.25	3.0
Ashland *b*	74	20	47.6	1.72	10.0
Aurora *[1]	68	23	46.7	4.59	
Aurora (near)	65	19	45.2	6.12	1.0
Bay City	74	22	48.8	10.40	1.0
Brownsville *[1]	68	26	49.3	3.84	6.0
Bullrun	55	20	43.0	10.39	1.0
Oregon—Con'd.	°	°	°	*Ins.*	*Ins.*
Burns	65	1	36.2	0.47	4.5
Cascade Locks	60	17	45.6	10.52	3.0
Comstock *[1]	65	26	47.9	3.86	
Coquille	......	......	......	5.07	
Corvallis	66	24	48.2	3.46	
Dayville	69	−11	41.4	0.74	2.5
Ella	......	......	......	1.28	6.0
Eugene	65	22	46.8	3.55	2.0
Fairview	65*	27*	47.4*	5.75	1.0
Falls City	59	17	43.8	12.27	3.9
Forest Grove	66	11	43.3	6.81	7.5
Gardiner	66	28	51.2	7.91	2.0
Glenora	63	16	43.0	12.32	6.5
Government Camp	73	2	40.0	6.05	26.0
Grants Pass	69	30	47.5	1.53	T.
Hare	73	27	50.5	7.85	4.0
Hood River (near)	61	3	41.5	5.46	9.5
Jacksonville	70	29	46.2	1.45	4.0
Joseph	70	− 3	34.6	1.25	10.0
Junction City *[1]	64	20	48.1	3.96	......
Kerby	69	26	47.8	4.48	3.5
Klamath Falls	60	15	40.9	......	......
Lafayette *[1]	65	21	44.9	4.98	1.1
Lagrande	64	5	40.2	1.25	1.0
Lonerock	63	4	36.4	0.84	3.5
McMinnville	65	21	44.7	7.04	......
Merlin *[1]	68	32	47.3	......	......
Monmouth *a* *[1]	62	20	44.8	4.33	0.2
Monroe	63	18	46.8	5.67	2.0
Mount Angel	63	19	45.4	6.19	T.
Nehalem	......	......	......	8.82	2.0
Newberg	67	20	45.7	6.02	T.
Newbridge	62	3	35.4	0.87	2.0
Newport	71	24	50.4	9.34	T.
Pendleton	64	− 4	42.1	1.63	5.5
Placer	......	......	......	2.22	1.0
Prineville	76	8	42.8	0.25	T.
Riddles *[1]	72	26	48.6	1.46	2.0
Salem *b*	......	20	......	2.76	
Sheridan *[1]	60	20	41.6	5.20	3.0
Silverlake	74	4	39.9	0.40	3.0
Silverton *[1]	64	20	48.0	4.81	T.
Siskiyou *[1]	62	26	39.5	2.45	16.0
Sparta	58	10	36.1	2.48	18.0
Springfield *[1]	65	24	46.3	3.87	1.5
Stafford	64	17	45.0	7.30	3.0
The Dalles	62	3	40.4	2.25	8.0
Tillamook	......	......	......	3.47	T.
Toledo	79	24	49.2	7.58	0.5
Umatilla	......	......	......	0.54	1.5
Vale	65	8	36.0	0.80	4.0
Westfork *[1]	60	27	43.8	3.15	4.0
Weston	65	− 7	38.8	3.24	12.0
Williams	67	28	46.0	2.12	6.0
Pennsylvania.					
Altoona	70	17	41.2	4.54	......
Athens	68	20	41.8	4.60	3.0
Beaver Dam	......	......	......	3.87	1.0
Bellefonte	69	21	44.0	4.49	0.2
Brookville	......	......	......	4.94	6.7
Browers Lock	......	......	......	1.67	......
Butler	68	7	40.2	5.36	7.4
Carlisle	70	22	44.8	3.38	T.
Cassandra	66	15	38.9	4.20	7.0
Chambersburg	73	22	44.6	3.02	
Coatesville	76	23	46.9	2.02	
Confluence	70	10	41.8	6.68	11.3
Coopersburg	73	24	47.2	2.12	
Davis Island Dam	......	......	......	4.12	1.0
Derry Station	74	11	43.8	6.33	12.0
Driftwood	......	......	......	4.23	
Duncannon	......	......	......	3.66	
Dushore	65	12	39.4	3.38	1.2
Dyberry	69	13	39.7	2.90	5.2
East Mauch Chunk	71	18	43.4	2.75	0.5
Easton	71	23	45.5	2.51	T.
Ellwood Junction	......	......	......	5.67	8.0
Emporium	65	12	40.4	5.05	3.0
Ephrata	76	20	46.8	1.89	
Forks of Neshaminy *[1]	70	22	43.8	2.66	
Franklin	71	17	41.2	4.42	T.
Freeport	......	......	......	5.00	5.0
Girardville	......	......	......	3.77	1.5
Grampian *[1]	62	10	37.4	4.71	7.0
Greensboro	76	15	45.0	6.59	1.0
Hamburg	......	......	......	3.00	
Hawthorn	69	9	40.8	4.92	8.3
Herrs Island Dam	......	......	......	3.93	T.
Huntingdon *a*	72	21	44.4	4.59	0.7
Huntingdon *b*	......	......	......	4.33	0.3
Irwin	......	......	......	4.94	3.0
Johnstown	73	19	43.6	5.84	4.0
Karthaus	......	......	......	2.30	3.0
Keating	......	......	......	5.03	0.5
Kennett Square	76	23	47.8	1.71	
Lawrenceville	74	16	40.9	6.36	3.0
Pennsylvania—Cont'd.	°	°	°	*Ins.*	*Ins.*
Lebanon	74	20	45.3	2.85	0.5
Leroy	65	17	39.4	4.71	4.6
Lewisburg	71	21	44.1	4.24	0.5
Lockhaven *a*	71	27	46.8	4.94	1.0
Lockhaven *b*	......	......	......	4.95	......
Lock No. 4	......	......	......	5.01	0.3
Lycippus	70	14	43.0	5.35	9.7
Mifflin	......	......	......	2.15	
Oil City	......	......	......	5.22	5.0
Parker	......	......	......	4.20	4.6
Philadelphia	74	29	49.8	3.30	T.
Quakertown	74	20	45.5	2.56	T.
Reading[2]	......	......	45.3	1.86	......
Renovo *a*	......	......	......	4.40	T.
Renovo *b*	68	19	42.8	5.73	1.0
Saegerstown	69	13	39.8	5.95	5.0
St. Marys	65	12	38.7	3.44	......
Selinsgrove	72	21	44.7	3.89	T.
Shawmont	......	......	......	2.42	......
Sinnamahoning	......	......	......	3.23	T.
Smethport	64	12	38.8	4.65	......
Somerset	70	8	40.9	6.46	14.5
South Eaton	70	21	43.3	3.21	T.
State College	67	17	41.8	4.10	0.9
Swarthmore	73	27	46.6	2.20	......
Towanda	68	20	42.0	3.53	2.0
Troutrun	......	......	......	5.80	0.5
Uniontown	69	19	44.8	6.92	6.5
Warren	67	17	39.4	5.85	6.2
Wellsboro	64	20	40.2	6.11	2.5
Westchester	74	25	47.0	2.00	
West Newton	......	......	......	4.91	3.0
Westtown	76	21	46.6	0.95	T.
Wilkesbarre	72	20	43.6	3.05	1.0
Williamsport	79	21	44.8	3.26	T.
York	74	23	46.0	2.81	
Rhode Island.					
Bristol	65	22	45.9	3.42	T.
Kingston	70	14	43.2	5.02	1.0
Pawtucket	74	22	45.0	4.40	T.
Providence *a*	72	21	45.2	4.54	T.
Providence *c*	72	19	43.8	4.88	T.
South Carolina.					
Batesburg	79	28	55.1	3.90	
Beaufort	85	33	61.8	3.48	
Blackville	84	29	57.8	2.28	
Calhoun Falls	......	......	......	3.55	
Camden	......	......	......	4.62	
Cheraw *a*	84	25	55.8	2.93	
Cheraw *b*	......	......	......	3.07	
Clemson College	77	24	53.2	2.33	
Conway	......	......	......	1.75	
Darlington	......	......	......	2.16	
Effingham	......	......	......	3.47	
Gaffney	......	......	......	4.52	
Georgetown	86	32	55.8	1.50	
Gillisonville	87	25	58.2	1.83	
Greenville	77	26	51.2	4.41	T.
Greenwood	79	27	53.8	3.49	
Holland	74	22	50.0	4.38	
Kingstree *a*	81	27	55.7	2.18	
Kingstree *b*	......	......	......	2.24	
Liberty	76	23	52.2	3.18	
Little Mountain	80	28	55.4	4.58	
Longshore	80	27	54.6	3.79	
Pinopolis *[1]	77	33	56.8	2.83	
St. George	81	30	56.8	3.32	
St. Matthews	83	31	58.0	2.47	
St. Stephens	......	......	......	2.21	
Santuck	80	24	54.2	4.04	
Shaws Fork	82	22	54.0	4.50	
Smiths Mills	......	......	......	4.04	
Societyhill	79	29	54.7	3.09	
Spartanburg	77	25	51.8	5.45	
Statesburg	84	31	57.9	2.51	
Summerville	81	30	57.2	1.99	
Temperance	86	27	57.6	3.14	
Trenton	77*	31*	57.9*	3.55	
Trial	92	25	56.4	1.76	
Walhalla	78	25	51.6	3.46	
Winnsboro	77	30	53.8	5.35	
Winthrop College	79	28	53.8	4.63	
Yemassee	82	29	57.8	2.31	
Yorkville	83	30	55.6	3.53	
South Dakota.					
Aberdeen	54	− 8	23.6	0.31	3.0
Academy	72	− 3	31.8	0.16	1.3
Alexandria	66	− 4	29.4	T.	T.
Armour	72	− 4	31.7	0.15	1.5
Ashcroft	65	−11	30.4	0.30	3.0
Bowdle	64	− 8	28.2	0.25	2.5
Brookings	69	− 9	25.8	0.45	4.5
Centerville	......	......	......	0.20	2.1
Chamberlain	70	− 4	28.8	0.08	0.8
Clark	68	− 3	26.8	0.14	1.4
Desmet	66	− 2	28.4	0.80	8.0

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
South Dakota—Cont'd.					
Doland	63	—4	26.6	0.29	2.9
Elkpoint	73	2	33.2	0.23	2.5
Farmingdale	......	......	......	0.06	1.5
Faulkton	67	—7	26.2	0.20	2.7
Flandreau	69	—5	26.6	0.66	7.2
Forestburg	72	—4	29.0	0.20	2.0
Fort Meade	74	—11	32.2	0.50	5.0
Fort Randall	......	......	......	T.	T.
Gannvalley	56	—5	27.4	0.20	2.0
Gary	71	—10	25.0	0.28	5.0
Grand River School	......	—10	......	0.25	6.5
Greenwood	72	2	34.6	0.19	1.9
Hartman	71	—4	28.5	0.55	6.8
Hotch City	75	—12	30.1	0.05	1.0
Hot Springs	70	—7	34.8	0.20	2.0
Howard	......	—6	......	0.18	1.8
Ipswich	66	—10	25.5	0.10	2.5
Kimball	70	—4	30.4	0.05	0.5
Leola	67	—8	25.0	0.20	2.0
Leslie	75	—11	29.6	0.10	1.0
Mellette	72	—4	28.3	T.	T.
Menno	70	—7	30.2	0.38	3.1
Millbank	70	—1	29.6	0.42	4.0
Mitchell	74	—2	31.8	0.07	0.6
Mound City	65	—10	23.2	0.42	4.2
Oelrichs	74	0	32.8	0.40	4.0
Parker	70	—2	30.6	0.19	2.0
Plankinton	70	—2	28.6	T.	T.
Redfield	70	—5	28.2	0.22	2.1
Rochford	68	—4	31.3	0.50	5.0
Rosebud	76	—10	31.1	0.60	6.0
St. Lawrence	73	—8	28.9	0.15	1.5
Silver City	......	......	......	0.50	5.0
Sioux Falls	58	—6	24.5	0.41	4.1
Sisseton Agency	64	—4	25.8	0.17	2.0
Spearfish	71	—10	33.0	0.58	7.0
Tyndall	65	—5	33.4	0.29	3.0
Vermillion	77[c]	0[c]	34.2[c]	0.20	2.0
Watertown	65	—8	26.2	0.12	1.2
Waubay	63	—8	24.0	0.22	2.2
Wentworth	71	—5	27.2	0.37	3.7
Wessington Springs	56	—9	24.9	0.20	2.0
Wolsey	......	......	......	0.24	2.5
Tennessee.					
Andersonville	73	21	49.1	6.05	T.
Ashwood	75	23	50.6	3.18	1.0
Benton	77	23	50.8	5.89	
Bluff City	......	......	......	3.88	T.
Bolivar	75	25	49.2	7.41	T.
Bristol	76	22	47.3	3.56	T.
Byrdstown	76	19	48.6	10.27	3.0
Carthage	78	25[b]	52.5[d]	6.70	
Charleston	......	......	......	6.08	
Clarksville	78	26	49.6	10.16	T.
Clinton	......	......	......	6.01	
Decatur	75	24	50.2	4.88	
Dickson	76	22	48.4	4.44	0.4
Dover	78	21	49.8	9.83	T.
Elizabethton	79	20	46.8	3.81	T.
Elk Valley	......	20	......	5.65	T.
Erasmus	73	17	46.9	6.10	2.3
Florence	76	25	48.7	5.95	T.
Franklin	76	24	49.2	8.52	3.0
Grace*[1]	78	20	51.8	5.10	1.0
Greeneville	77	19	48.0	4.10	1.5
Harriman	74[c]	22[c]	48.8[c]	4.91	T.
Hohenwald	75	17	47.2	8.03	3.0
Iron City	76	22	50.6	3.61	
Jackson	72	26	50.1	......	......
Johnsonville	77	19	50.0	9.24	T.
Jonesboro*[1]	74	24	45.2	3.69	2.0
Kingston	......	......	......	4.56	
Lafayette*[5]	70	24	46.4	9.00	T.
Lewisburg	76	23	50.0	4.15	3.0
Lynnville	79	24	51.0	3.35	2.0
McMinnville	76	19	50.4	4.51	2.0
Maryville*[5]	79	22	50.1	5.91	1.0
Newport	77	24	49.5	4.25	T.
Nunnelly	75	20	48.6	7.20	T.
Oakhill	80	18	50.9	10.74	3.0
Palmetto	80	22	51.8	3.96	2.0
Peryear	......	......	......	9.20	
Pope	77	19	50.2	7.83	1.0
Rogersville	73	23	47.8	5.39	T.
Rugby	73	13	46.4	8.67	1.0
Savannah	82	24	51.0	5.10	
Sewanee	69	20	48.2	4.48	T.
Silverlake	70	19	43.0	3.82	......
Springdale	78[d]	23[d]	48.3[d]	5.89	......
Springfield	80	20	49.2	9.30	T.
Tazewell	......	......	......	6.08	1.0
Tellico Plains	78	22	51.7	5.92	
Tracy City	69	19	47.4	3.66	1.8
Trenton	79	21	48.8	7.40	T.
Tullahoma	73	18	48.6	3.45	2.0
Union City	70	25	47.8	7.00	
Tennessee—Cont'd.	°	°	°	*Ins.*	*Ins.*
Waynesboro	75	22	49.0	4.45	
Wildersville	74	25	50.0	7.48	
Yukon	74	24	51.2	3.65	T.
Texas.					
Alvin	......	......	......	1.65	
Anna [5]	85	20	54.6	0.99	
Anson	......	......	......	0.40	
Austin *a*	83	25	58.6	1.70	
Austin *b**[5]	80	27	59.6	......	
Ballinger	79	29	54.0	0.93	
Beeville	90	30	61.0	1.95	
Bigspring	......	......	......	1.18	
Blanco	84	24	55.6	1.96	
Boerne*[1]	81	28	57.6	1.35	
Booth	......	......	......	3.28	
Bowie	84	26	55.3	0.10	
Brazoria	84	33	64.8	1.04	
Brenham	85	30	62.9	6.71	
Brighton	90	35	67.3	0.83	
Brownwood	82	27	57.0	1.10	
Burnet*[1]	78	29	58.0	2.06	
Coleman [b]	84	33	57.4	0.78	
Colorado [d]	87	29	55.9	......	
Columbia	85	30	62.3	2.94	
Corsicana	80	29	56.2	0.30	
Cuero	86	30	63.3	3.15	
Dallas	83	25	56.5	0.61	
Danevang	85	29	63.2	1.91	
Duval	82	32	59.6	1.41	
Estelle	83	25	57.6	1.70	
Fort Brown	91	37	70.0	0.40	
Fort McIntosh	96	32	67.8	......	
Fort Ringgold	95	36	68.5	0.03	
Fredericksburg*[1]	81[b]	28	55.6[d]	5 31	
Gainesville	83	25	56.2	0.60	
Grapevine	88	26	57.4	1.18	
Hale Center	82	27	53.0	1.16	
Hallettsville	83	31	62.2	3.03	
Haskell	82	29	55.4	0.99	
Henrietta	81	27	54.2	0.97	
Hewitt	......	......	......	0.58	
Hondo	......	......	......	1.42	
Houston	82[b]	32	66.8[d]	4.96	
Hulen	89	29	64.5	1.32	
Huntsville	83	29	60.2	8.45	
Ira	80	29	53.8	0.72	
Jacksonville	82	25	57.4	3.36	
Jasper	87	31	61.1	3.10	
Kaufman	82	27	59.0	......	
Kent	......	......	......	0.19	
Kerrville	82	23	56.4	6.01	
Kopperl	......	......	......	0.00	
Lampasas	84	22	59.4	0.86	
Laureles Ranch	......	......	......	0 52	
Llano*[5]	81	31	58.8	0.90	
Longview	82	28	57.6	1.48	
Luling	85	28	61.0	5.94	
Mann	81	23	55.0	0.62	
Menardville	89	29	55.2	2 04	
Nacogdoches	85	26	58.2	6.54	
New Braunfels	82[e]	31[e]	58.2[e]	1.48	
Panter	......	......	......	0.34	
Paris *a*	82	25	57.2	1.89	
Point Isabel*[1]	84	54	70.6	0.40	
Rhineland	81	28	53.6	0.78	
Rockisland	86	29	62.8	3.78	
Rockport*[1]	83	45	69.3	......	
Runge	98	29	64.0	1.72	
Saginaw*[1]	82	27	56.8	0.35	
Sanderson	79	22	57.0	T.	
San Marcos	97	28	60.9	3.65	
Sugarland	85	30	63.6	2.70	
Sulphur Springs	80	28	58.0	1.45	
Temple *a*	82	27	58.2	1.29	
Temple *b*	82	25	57.6	1.21	
Trinity	84	25	60.2	8.43	
Valentine	90	30	59.4	......	
Victoria	......	......	......	1.98	
Waco	82	31	59.2	0.60	
Waxahachie	82	26	58.2	0.70	
Weatherford	82	25	56.5	0.32	
Wichita Falls	......	......	......	0.35	
Utah.					
Alpine	......	......	......	3.49	6.0
Blackrock	......	......	......	0.16	......
Bluecreek*[1]	60	20	38.4	2.11	6.0
Castledale	65	13	40.0	0.40	
Cisco	64	12	39.4	T.	
Corinne	70	22	41.6	1.87	8.0
Deseret	75	......	......	0.48	1.0
Fillmore	78	19	45.6	0.66	
Fishsprings	79[d]	25[d]	43.8[d]	......	......
Fort Duchesne	63	11	35.9	0.51	1.2
Frisco	66	22	43.2	0.15	3.0
Giles	65	10	39.4	0.40	
Green River	69	13	41.0	0.27	......
Utah—Cont'd.	°	°	°	*Ins.*	*Ins.*
Grover	76	15	41.3	0.30	3.0
Heber	65	15	37.8	4.42	24.0
Henefer	61	5	32.2	3.13	12.5
Hite	70	29	47.8	......	......
Holyoake	71	20	44.5	1.01	
Huntsville	......	......	......	5.07	14.0
Kelton*[1]	62	22	37.2	0.30	3.0
Levan	64	18	40.4	1.45	5.1
Loa	62	1	29.7	0.50	5.0
Logan	64	15	39.6	2.69	......
Manti	73	18	42.1	0.80	5.0
Millville	......	......	......	2.75	......
Minersville	......	18	......	1.33	9.0
Moab	69	18	44.2	0.53	T.
Mount Pleasant	67	19	40.9	1.56	6.0
Ogden*[1]	62	26	42.0	3.87	12.5
Park City	57	13	36.6	3.50	35.0
Parowan	67	14	40.5	0.34	3.2
Pinto	68	14	38.2	3.16	
Promontory	......	......	......	0.50	
Provo	74	14	42.4	3.50	
Richfield	......	......	......	0.30	3.0
St. George	80	19	47.4	0.89	T.
Scipio	69	8	39.6	1.17	......
Snowville	63	12	37.6	0.71	2.0
Thistle	72	17	41.4	1.80	3.0
Tooele	62	20	41.8	1.87	4.0
Tropic	64	10	35.9	0.98	......
Vernal	65	17	39.0	1.21	1.0
Woodruff	57	3	32.5	......	......
Vermont.					
Bennington	69	14	41.0	3.46	......
Burlington	65	15	39.5	5.74	24 0
Chelsea	62	6	34.6	5.44	18.0
Cornwall	67	10	38.1	4.10	11.0
Derby	62	1	33.9	5.01	21.0
Enosburg Falls	67	0	35.0	7.54	33.6
Hartland	65	1	37.2	5.45	7.6
Jacksonville	67	10	34.2	3.79	7.0
Manchester	65	9	37.8	3.53	5.0
Norwich	64	3	36.4	4.98	9.0
St. Johnsbury	63	1	34.6	6.15	22.2
Vernon*[6]	64	13	38.4	10.12	7.0
Wells	66	12	36.2	5.34	11.0
Woodstock	64	2	35.8	5.35	10.0
Virginia.					
Alexandria	77	26	49.7	1.91	T.
Ashland	82	23	51.2	2.43	T.
Barboursville	82	24	51.0	2.48	
Bedford	80	25	49.8	1.87	T.
Bigstone Gap	74	21	47.1	7.03	1.0
Birdsnest*[1]	69	32	51.4	2.70	T.
Blacksburg	76	19	45.2	4.55	4.5
Bon Air	79	25	50.8	2.99	
Burkes Garden	68	16	42.2	4.64	2.0
Callaville	76	23	50.3	4.77	
Christiansburg	......	......	......	3.10	0.5
Cliftonforge	77	24	48.6	4.11	T.
Columbia	......	......	......	1.12	
Dale Enterprise	77	15	45.9	3.11	1.0
Farmville	80	17	51.0	1.82	T.
Fontella	81	24	52.0	2.26	T.
Fredericksburg	77	24	49.8	2.09	T.
Grahams Forge	76[e]	19[e]	46.0[e]	3.02	0.8
Hampton	78	32	56.6	4.93	
Lexington	81[e]	22[b]	48.9[e]	2.73	
Lincoln	76	24	48.0	......	......
Manassas	78	24	49.6	2.48	
Marion	76[e]	20[e]	47.2[e]	4.03	1.5
Meadowdale	......	12	......	6.51	4.5
Newport News	75	30	53.3	5.54	
Petersburg	83	25	53.4	4.87	
Quantico	78	23	49.0	......	......
Radford	......	......	......	3.21	1.0
Speers Ferry	......	......	......	5.12	0.1
Spottsville	80	23	52.5	3.49	T.
Staunton	77	20	49.6	2.88	T.
Stephens City	76	20	47.6	3.79	......
Warrenton	70	29	51.0	2.03	T.
Warsaw	78	24	52.0	3.07	
Westpoint	80	22	52.1	5.20	T.
Williamsburg	78	26	53.1	3.60	T.
Woodstock	76	21	47.4	2.19	1.0
Wytheville	74	22	45.6	4.12	3.2
Washington.					
Aberdeen	66	22	44.8	9.34	3.7
Anacortes	......	......	......	1.82	0.2
Ashford	......	......	......	8.15	13.8
Bremerton	63	16	42 2	4.39	1.5
Bridgeport	64	0	36.0	1.10	
Brinnon	54	20	41.3	7.03	2.8
Cedonia	48	—5	31.2	2.23	7.5
Centerville	55	—16	34.7	3.61	7.0
Clearwater	56[f]	22	41.6[e]	13.32	2.8
Cle Elum	55	—6	33.8	2.98	8.0
Colfax	61	—8	37.8	2.54	6.5

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Washington—Cont'd.					
Colville	55	−11	31.0	2.30	10.3
Conconully	50	−5	30.6	1.57	6.8
Coupeville	58	19	43.0	1.21	1.5
Crescent	53	−8	32.0	2.06	7.0
Dayton	63	4	38.8	1.50	3.8
Ellensburg	54	−16	32.9	1.27	
Ellensburg (near)	52	−16	33.6	1.50	7.0
Grandmound	61	6	42.0	5.26	5.5
Granite Falls				4.34	4.5
Hooper	60	−10	37.6	1.75	6.0
Issaquah				4.75	6.5
Lacenter	62	23	43.6	4.87	1.8
Lakeside	53	5	34.1	1.20	0.6
Lind	55	−11	34.8	1.47	6.5
Mayfield	49	20	38.8	5.09	4.0
Mottinger Ranch	59	1	39.5	0.64	0.5
Moxee Valley	58	−8	34.9	0.95	2.5
New Whatcom	61	12	41.7	2.49	1.5
Northport	55	−11	30.4	2.54	8.0
Olga	62	14	40.7	2.22	2.0
Olympia	61	14	43.6	6.11	
Pasco	58	−12	37.7	0.90	6.0
Pinehill	57	−5	38.9	5.00	14.0
Port Townsend	57	20	43.3	1.18	1.3
Republic	54	−15	29.4	1.94	13.5
Rosalia	56	−10	35.6	2.59	4.4
Sedro	65	9	41.6	3.24	
Shoalwater Bay *[10]	61	25	47.2		
Silvana	56	10	40.6	0.61	
Snohomish	66	12	42.3	2.88	4.0
Snoqualmie				5.84	8.0
Southbend	69	20	46.4	9.46	0.5
Sprague				0.80	6.0
Sunnyside	56	−7	37.0	0.64	1.0
Twin	53	18	40.6	6.06	2.0
Union	57	14	40.8	8.77	10.3
Vancouver	64	13	45.0	4.34	0.7
Vashon	56	18	42.4	4.66	3.8
Waterville	50	−11	29.8	0.80	6.0
Wenatchee (near)	56	−3	32.0	1.40	7.2
Westsound	60	13	54.2	2.46	1.2
Wilbur	55	−15	32.6	2.39	12.0
West Virginia.					
Beckley	70	21	45.0	2.94	1.5
Beverly	75	10	43.6	5.65	5.0
Bluefield	79	20	46.0	5.47	7.0
Buckhannon	70	12	43.2	6.69	3.5
Burlington	74	13	46.7	4.09	T.
Camden	68	17	45.0	5.57	2.2
Central	77[c]	9[c]	42.9[c]	4.87	0.5
Charleston				6.14	T.
Creston				4.81	T.
Dayton	78	10	49.4	2.54	2.0
Eastbank	70			4.35	
Elkhorn	74	23	46.6	5.85	7.5
Fairmont				5.59	1.0
Glenville	79	13	45.0	4.59	T.
Grafton	78	12	43.5	6.18	3.0
Harpers Ferry				3.62	0.1
Hinton *a*				5.68	1.0
Hinton *b*	80	23	46.4		
Huntington	76	17	44.6	7.40	1.0
Josiah	79	12	44.6	5.55	T.
Lewisburg	73	12	45.2	6.69	
Magnolia	76	17	47.4	2.71	
Martinsburg	71	17	46.8	3.00	T.
Morgantown	77	13	45.4	5.06	0.2
New Martinsville	77	14	46.8	5.38	
Oceana	75	20	45.8	6.51	
Parsons	73	11	43.0	4.00	
Philippi *a*	76	9	43.4	5.62	4.0
Philippi *b*				5.68	
Point Pleasant	81	27	48.6	6.96	T.
Powellton	74	21	47.4	6.66	
Princeton	70	20	44.9	8.88	7.0
Romney	76	16	47.2	3.65	
Rowlesburg				3.77	5.0
Southside	78	18	46.7	5.78	T.
Spencer	86	11	48.6	4.77	1.5
Terra Alta	73	10	42.6	5.20	8.0
Uppertract	72	20	46.2	4.42	1.0
Wellsburg	70	21	43.8	3.75	6.0
Weston *a*				5.50	1.4
Weston *b*	79	14	47.0		
Wheeling *a*				4.69	0.9
Wheeling *b*	76	18	47.6	4.88	0.5
Williamson	78	22	46.9	7.40	T.
Winfield	77	16	46.4	5.31	T.
Wisconsin.					
Amherst		6		0.75	3.5
Antigo				0.45	4.5
Ashland				1.22	10.0
Barron	48	−4	23.3	1.00	10.0
Bayfield	64	2	29.3	0.77	7.8
Beloit	68	9	34.4	1.84	3.2
Brodhead	67	3	31.8	1.89	2.0
Wisconsin—Cont'd.					
Butternut	58	0	24.2	1.77	12.0
Casco	60	12	31.2	0.21	2.0
Chilton	69	10	30.8		
Delavan	64	7	34.2	0.73	1.0
Dodgeville	65	−1	30.9	2.01	3.0
Easton	67	1	30.6	1.55	
Eau Claire	62	4	28.6	1.32	10.0
Florence	61	6	27.2	3.78	12.0
Fond du Lac	62	5	31.4	0.94	5.1
Grand River Locks				1.82	7.0
Grantsburg	62	−3	27.0	1.05	10.5
Hartford	66	3	32.8	2.02	4.8
Hartland	68	7	33.8	3.30	
Harvey	59	7	32.2	3.32	7.0
Hayward	62	−1	26.6	0.71	7.2
Heafford	58	0	25.7	1.35	8.0
Hillsboro	66	4	30.2	1.26	2.0
Knapp	60	−2	25.6	0.37	3.7
Koepenick				1.50	12.0
Lancaster	65	2	30.6	1.81	6.5
Madison	64	11	32.6	1.72	5.0
Manitowoc	61	10	32.9	2.46	6.2
Meadow Valley	67	6	29.2	1.22	3.0
Medford	60	−4	26.2	0.65	
Menasha				1.40	4.4
Neillsville	62	5	28.6	1.30	6.0
New London	62	7	29.8	1.62	3.5
Oconto	64	9	32.4	1.48	5.5
Osceola	61	−7	26.6	0.71	6.5
Oshkosh	57	12	32.8	1.20	
Pepin	64	4	28.6	0.47	5.0
Pine River	64	5	30.1	1.44	5.0
Portage	63	7	31.5	1.95	3.0
Port Washington	65	5	35.0	1.85	3.5
Prairie du Chien *a*	70	6	34.6	1.87	6.0
Prairie du Chien *b*				1.36	6.0
Racine	65	10	37.5	4.19	
Shawano	62	9	30.3	1.21	5.0
Sheboygan	64	12	34.5	2.51	4.0
Spooner	62	−2	26.5	0.88	7.2
Stevens Point[b]	68	4	29.1	0.60	6.0
Sturgeon Bay Canal *[10]	60	14	32.3		
Two Rivers *[10]	58	13	34.0		
Valley Junction	65	6	30.4	1.24	2.8
Viroqua	65	4	30.4	2.10	7.1
Watertown	62	3	31.4	2.30	5.0
Waukesha	62	8	33.0	1.86	4.0
Waupaca	68	6	30.2	1.34	5.0
Wausaukee	63	8	30.8	1.15	4.0
Westbend	63	9	32.4	2.48	0.2
Westfield	60	8	30.2	1.70	3.0
Whitehall	61[c]	3[c]	29.4[c]	0.71	4.0
Wyoming.					
Alcova	67	−3	38.4	T.	T.
Basin	67	−4	29.6	0.02	0.2
Bigpiney	53	−5	25.4	0.40	3.5
Bitter Creek	68	−2	33.4	0.80	8.0
Burlington	69	−6	30.6	T.	T.
Casper	66	−2	37.6	0.12	1.5
Centennial	58	9	33.8	0.55	5.0
Chugwater	64	3	37.6	0.05	0.5
Cody	68	−5	37.2	0.03	0.3
Daniel	55	0	30.6	1.60	16.0
Evanston	58	0	31.4	2.13	9.5
Fort Laramie	72	−3	35.9	0.24	3.3
Fort Washakie	66	3	34.6	0.02	0.2
Fort Yellowstone	57	−12	29.0	1.17	11.7
Fourbear	61	−13	32.7	0.50	6.0
Hyattville	65	−8	31.8	T.	T.
Iron Mountain	66	1	36.6	0.11	1.1
Kimball Ranch	66	−19	34.4	0.40	4.0
Laramie				0.06	0.6
Lovell	67	−6	26.4	0.20	2.1
Lusk	64	−5	33.3	0.00	0.0
Myersville	60	−14	29.6	0.20	3.0
Parkman	70	−15	32.7	0.06	3.5
Pinebluff	71	3	36.4	T.	T.
Rawlins	56	9	34.0	0.71	7.1
Saratoga	69	9	36.0	0.78	8.5
Sheridan	73	−11	30.4	0.10	1.0
South Pass City	54	4	30.0	0.93	9.3
Thermopolis	67	−2	33.2	0.00	0.0
Cuba.					
Aguacate	91	48	72.6	1.53	
Alvarez				1.64	
Australia	88	56	74.7	0.88	
Banaguises	90	52	72.9	0.22	
Batabano	84	55	72.4	1.07	
Cardenas	90	57	76.2	0.41	
Cruces				0.15	
Gibara	92	61	76.0	6.04	
Guabairo				0.50	
Guanajay	87	55	72.9	1.32	
Guantanamo	91	61	77.4	2.61	
Holguin	90	61	76.2	1.81	
Limonar	87			T.	
Cuba—Cont'd.					
Magdalena				0.62	
Manzanillo	94	64	78.3	3.44	
Matanzas	89	54	72.7	1.38	
Moron Trocha	92	59	76.4	4.93	
Nuevitas	90	67	77.8	8.47	
Numero	85	62	72.8	2.37	
Pinar del Rio	88	53	73.6	1.06	
Sagua la Grande	90	63	75.0	2.64	
San Cayetano	90	53	74.4	0.90	
Santa Clara	98	52	74.8	2.87	
Soledad	89	59	74.0	0.18	
Union de Reyes	87	62	75.4	0.00	
Yeguajay	91	58	75.6	2.74	
Porto Rico.					
Adjuntas	89	68	80.1	2.82	
Aguadilla	89	66	80.2	2.70	
Arecibo	88	63	76.6	6.31	
Bayamon	95	62	78.6	9.06	
Canovanas	89	69	78.0	5.97	
Cayey	98	59	76.9	4.08	
Cidra	91	60	74.5	6.44	
Coamo	93	66	79.0	13.47	
Comerio	96	61	76.2	6.42	
Corozal	93	60	76.0	9.79	
Fajardo	92	67	80.0	3.42	
Hacienda Coloso	93	63	77.0	2.03	
Hacienda Perla	90	70	78.7	7.55	
Humacao	98	73	82.8	0.63	
Isabela	89	66	79.0	6.11	
La Isolina				10.43	
Lajas	90	57	75.8	3.83	
Manati	94	63	77.5	9.51	
Maunabo	89	72	80.6	4.12	
Mayaguez	93	65	79.2	2.97	
Port America	87	66	78.0	0.45	
Puerta de Tierra	89	71	79.9	5.44	
San German	94	60	78.1	5.39	
San Lorenzo	92	60	77.6	4.18	
Utuado	90			8.11	
Vieques	89	68	77.8	2.10	
Yanco	93	61	78.0	8.25	
Mexico.					
Ciudad P. Diaz	82	36	61.2	0.36	
Coatzacoalcos	86	61	74.5	1.82	
Leon de Aldamas	79	38	60.8	0.97	
Puebla	77	40	58.8	0.59	
Tampico	84	54	71.5	0.39	
Topolobampo *[1]	91	52	71.4	0.40	
Vera Cruz	85[c]	60	74.8[c]	1.67	
New Brunswick.					
St. John	58	15	37.8	6.00	8.9
Nicaragua.					
Rivas	90	74	81.8	1.18	

Late reports for October, 1900.

Stations.	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	Ins.	Ins.
Elba	90[c]	46[c]	70.2[c]	3.90	
Alaska.					
Kenai	54	−5	32.2	2.19	11.0
Orca	53[f]	25[f]	37.8[f]	9.78	11.1
Tyoonok	61	10	34.6	2.53	14.2
Wood Island	63[f]	22[f]	42.0[f]	1.86	0.5
Arizona.					
Arizona Canal Co. Dam	93	39	72.2	0.46	
Benson *[1]	91	35	70.0	0.00	
Camp Creek	87	42	67.6	0.91	
Cochise *[1]	89	45	67.1	0.00	
San Simon *[1]	84	40	65.2	0.00	
Walnutgrove				0.00	
California.					
Agnew	89	36	61.8	1.19	
Blue Lakes City				1.97	
Lakeside				0.25	
Placerville	91	28	59.2	3.62	
San Miguel Island	80	46	61.2	0.24	
Kansas.					
Colby	96	22	57.6	0.10	
Oberlin				0.00	
Nebraska.					
Hayes Center				T.	
Lynch	90	26	57.4	2.10	
Rulo				5.85	
Texas.					
Hulen[b]	90	49	72.8	3.83	
Vermont.					
Woodstock	76	18	50.2	2.79	
Washington.					
Snoqualmie				9.40	
Cuba.					
Sagua la Grande	94	66	79.2	3.50	
Union de Reyes	90	70	80.3	3.65	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

EXPLANATION OF SIGNS.

* Extremes of temperature from observed readings of dry thermometer.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.
[7] Mean from hourly readings of thermograph.
[8] Mean of sunrise and noon.
[10] Mean of sunrise, noon, sunset, and midnight.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance "n" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks, of whatever duration, in the precipitation record receive appropriate notice.

CORRECTIONS.

June, 1900, Alabama, Warrior, make precipitation 18.65 instead of 17.75; July, 1900, Alabama, Oxanna, make precipitation 6.41 instead of 6.61; August, 1900, Alabama, Fort Deposit, make precipitation 4.35 instead of 4.55; August, 1900, page 328, make average maximum pressure at Honolulu 29.991 instead of 29.954.

October, 1900, Missouri, Mineralspring, make minimum and mean temperatures 39° and 62.9°, instead of 33° and 59.9°.

NOTE.—The following change has been made in names of stations, Oklahoma, Wood changed to Poarch.

TABLE III.—*Mean temperature for each hour of seventy-fifth meridian time, November, 1900.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midn't.	Mean.
Bismarck, N. Dak....	19.0	18.4	17.9	17.8	17.5	17.3	16.6	16.9	16.7	17.6	19.6	21.9	24.2	26.0	27.3	27.7	27.2	25.6	23.3	22.0	20.7	20.0	19.3	18.8	20.8
Boston, Mass	43.0	42.7	42.5	42.4	42.3	42.3	42.6	43.2	44.8	46.0	47.9	48.7	48.9	49.4	49.0	48.4	47.8	46.5	45.6	45.3	44.7	43.8	43.1	42.7	45.1
Buffalo, N. Y........	40.9	40.3	40.1	40.0	39.7	39.4	39.5	39.7	39.9	40.6	41.6	42.5	43.5	43.8	44.0	43.9	43.0	42.2	42.0	42.0	41.5	40.8	40.8	40.4	41.3
Cedar City, Utah....	41.9	41.3	41.1	40.1	39.9	39.2	38.8	38.0	37.5	38.1	41.3	44.9	47.3	49.2	50.7	52.1	53.1	52.8	51.7	47.5	45.8	44.5	43.3	42.3	44.3
Chicago, Ill..........	37.7	37.2	36.8	36.3	35.9	35.6	35.3	35.3	35.5	36.4	37.6	39.0	40.2	41.0	41.5	42.0	41.5	40.9	39.7	39.5	38.4	38.0	37.5	37.1	38.2
Cincinnati, Ohio....	43.3	42.9	42.1	41.7	40.8	40.5	39.5	40.5	41.4	42.8	45.3	47.4	48.6	49.8	50.0	50.6	50.4	49.4	48.0	47.1	46.0	45.2	43.7	43.1	45.0
Cleveland, Ohio	41.8	41.6	41.0	40.5	40.3	39.7	39.5	39.4	39.5	40.8	42.3	43.1	43.9	44.5	44.9	45.1	44.7	44.2	43.3	42.9	42.3	42.0	41.4	41.3	42.1
Detroit, Mich........	38.1	37.8	37.4	37.0	36.6	36.3	36.3	36.3	36.9	37.8	38.9	39.7	40.4	40.8	41.3	41.4	41.1	40.5	40.1	39.7	39.4	38.9	38.2	37.6	38.7
Dodge, Kans.........	36.9	36.0	35.4	35.1	34.4	33.7	33.0	32.7	33.1	35.5	40.7	45.1	49.3	51.9	53.6	54.7	54.7	53.4	49.0	44.5	42.0	40.7	39.5	38.5	41.8
Eastport, Me.........	37.2	37.0	36.8	37.0	36.7	37.0	37.4	37.8	38.6	39.1	39.8	40.6	41.2	41.6	41.1	40.5	39.9	39.5	39.0	38.7	37.9	37.5	37.2	37.1	38.6
Galveston, Tex.......	63.6	63.4	63.0	62.5	62.0	61.9	61.5	61.3	62.1	63.5	65.2	66.5	67.4	67.9	69.4	69.5	69.2	68.1	66.6	65.6	64.8	64.6	64.2	63.7	64.9
Havre, Mont..........	21.0	20.0	19.5	18.7	17.9	17.6	16.9	17.3	17.4	18.2	20.8	23.8	27.0	29.1	30.9	31.4	31.2	29.9	27.2	26.0	24.4	21.6	23.1	21.9	23.2
Independence, Cal..	48.7	47.9	46.1	44.6	44.7	44.4	43.6	43.8	41.5	40.7	43.1	46.5	50.0	53.8	56.8	59.2	60.7	60.8	59.6	57.2	53.7	52.4	51.0	49.6	50.0
Kalispell, Mont	26.5	25.9	25.7	24.9	24.6	24.3	24.1	23.9	23.1	23.0	23.1	25.2	27.1	29.3	31.4	32.4	33.1	32.9	31.4	30.3	29.1	28.3	27.9	27.0	27.3
Kansas City, Mo.....	39.9	39.7	39.2	39.0	38.7	38.6	37.8	37.4	37.6	39.0	40.9	43.0	44.9	46.0	47.0	47.5	47.6	46.7	45.3	43.9	42.8	41.9	41.2	40.4	41.9
Key West, Fla........	72.9	72.7	72.6	72.4	72.1	72.0	71.9	73.2	73.6	74.3	74.8	75.3	75.9	76.1	76.0	75.5	75.2	74.4	73.8	73.9	73.4	73.2	73.1	72.9	73.8
Marquette, Mich	30.7	30.6	30.3	30.1	29.8	29.7	29.6	29.8	29.8	30.2	30.7	31.4	32.0	32.4	32.6	32.7	32.3	31.9	31.3	31.1	30.8	30.4	30.4	30.2	30.9
Memphis, Tenn.......	51.5	50.4	49.8	49.0	48.4	47.9	47.5	47.1	47.8	50.0	51.9	54.1	56.6	57.7	58.8	59.4	59.6	58.4	56.3	55.1	54.1	53.2	52.6	51.7	52.9
Mt. Tamalpais, Cal..	53.3	52.9	53.2	52.9	52.6	52.6	52.1	51.8	51.7	51.2	51.8	52.5	53.3	53.6	54.3	55.1	55.5	55.7	54.6	54.0	53.5	53.6	53.6	53.3	53.3
New Orleans, La.....	60.5	59.7	59.2	58.6	58.3	57.8	57.5	57.7	60.3	62.8	65.4	67.0	68.9	70.1	70.0	70.1	69.0	67.0	65.4	64.1	62.5	61.5	61.0	60.5	63.1
New York, N. Y......	46.7	46.5	46.2	46.1	46.1	45.8	45.8	46.0	46.4	47.9	49.4	50.4	51.3	52.0	52.6	52.7	51.7	51.1	50.1	49.2	48.1	47.6	47.2	46.9	48.5
Philadelphia, Pa.....	46.8	46.4	45.9	45.7	45.7	45.6	46.2	47.4	48.6	50.1	51.6	52.7	53.5	54.0	54.1	53.9	52.7	51.3	50.3	49.7	48.9	48.1	47.4	46.9	49.3
Pittsburg, Pa.........	43.7	43.6	43.3	42.5	42.0	41.8	41.6	42.2	43.1	44.0	45.3	46.8	47.5	48.1	49.2	49.0	48.5	47.9	46.8	46.4	45.4	44.9	43.7	43.4	45.0
Portland, Oreg......	44.6	44.1	43.8	43.8	43.3	43.3	43.0	43.6	42.7	42.7	42.8	43.6	45.1	46.4	47.6	48.8	49.7	49.8	49.5	48.5	47.3	46.6	45.8	45.3	45.5
St. Louis, Mo.........	44.4	44.0	43.5	43.0	42.3	42.1	41.8	41.9	42.5	44.1	46.2	48.3	50.5	52.0	52.9	53.2	52.7	51.8	50.4	49.4	48.0	47.2	46.3	45.5	46.8
St. Paul, Minn.......	29.1	28.7	28.4	27.9	27.6	27.2	26.9	26.2	26.2	26.3	27.3	28.7	30.0	30.8	31.7	32.4	32.7	32.5	31.4	30.8	30.2	29.7	29.1	28.8	29.2
Salt Lake City, Utah.	41.1	40.9	41.2	40.6	39.6	39.5	39.9	39.4	38.6	39.2	41.7	44.8	48.1	48.9	50.9	51.4	51.9	50.7	48.3	46.9	44.6	43.9	42.5	41.9	44.0
San Diego, Cal.......	60.8	60.7	60.4	60.2	59.6	59.5	59.4	59.9	58.8	59.0	61.4	64.1	67.4	69.5	70.0	69.6	69.9	69.5	68.7	66.7	64.9	61.7	62.8	61.9	63.7
San Francisco, Cal...	55.5	54.9	54.2	54.0	53.3	52.9	52.4	53.9	52.5	52.0	52.6	54.1	55.4	56.3	58.0	59.2	60.1	60.1	59.6	58.7	57.9	57.2	56.6	56.0	55.7
Santa Fe, N. Mex ...	37.9	37.1	36.3	35.6	34.6	34.9	33.6	33.7	33.0	37.1	40.5	42.8	44.5	46.1	48.6	49.3	49.6	48.6	45.8	42.1	40.2	39.5	38.7	38.1	40.3
Savannah, Ga.........	56.5	56.0	55.3	54.8	54.2	53.8	53.6	54.7	57.8	61.3	64.8	67.2	68.2	68.8	68.7	68.1	66.5	63.7	61.5	60.7	59.3	58.5	57.5	56.7	60.3
Washington, D. C....	45.7	45.5	45.4	45.0	44.9	44.6	44.2	45.4	47.6	49.6	51.6	53.1	54.5	55.4	55.7	55.4	54.1	52.2	50.5	49.4	48.1	47.4	46.3	45.7	49.0
West Indies.																									
Basseterre, St. Kitts.	76.5	76.2	76.0	75.6	75.6	76.8	80.1	81.6	82.7	83.7	83.6	83.3	83.3	82.8	82.0	80.9	78.6	77.9	77.8	77.9	77.6	77.2	77.0	76.6	79.2
Bridgetown, Bar.....	75.1	75.0	74.7	74.6	74.7	77.4	81.9	83.8	84.2	84.7	85.2	84.7	84.4	83.4	82.3	81.4	79.5	78.1	77.3	76.5	76.1	75.9	75.6	75.5	79.2
Cienfuegos, Cuba ...	69.5	68.8	68.5	68.3	68.2	68.3	68.9	72.6	75.8	78.0	80.7	82.2	83.0	82.6	82.5	81.4	79.0	76.5	74.2	72.9	72.2	71.5	70.6	69.9	74.4
Havana, Cuba........	71.8	71.2	70.7	70.3	70.3	70.1	70.1	72.2	75.4	77.8	79.1	80.0	79.7	79.9	79.2	78.5	77.5	76.0	75.3	74.7	74.1	73.3	72.8	72.1	74.7
Kingston, Jamaica..	72.7	72.3	72.1	71.7	71.7	71.6	71.9	76.4	79.9	82.4	84.4	85.1	85.4	84.9	84.5	83.3	81.4	78.9	77.2	76.1	74.9	74.1	73.7	72.8	77.5
Port of Spain, Trin..	73.8	73.9	73.7	73.4	73.0	75.1	78.8	81.1	84.4	84.5	84.1	83.8	82.7	82.8	82.3	81.8	79.9	78.7	77.6	76.7	75.8	75.1	74.7	74.3	78.4
P. Principe, Cuba ...	70.1	69.4	69.0	68.8	68.6	68.6	68.6	72.9	75.6	78.5	80.3	81.2	82.1	81.6	80.5	79.3	78.0	75.9	74.5	73.0	72.2	71.6	71.1	70.5	74.3
Roseau, Dominica ..	74.8	74.5	74.6	74.7	74.4	74.7	78.0	81.8	83.3	84.4	85.1	84.9	84.9	84.3	83.0	81.4	78.6	77.4	76.5	76.7	76.3	75.9	75.5	75.3	78.8
San Juan, P. R.......	75.4	75.2	74.7	74.6	74.5	75.3	76.6	78.8	82.1	82.7	82.8	83.4	83.5	83.0	82.0	81.0	79.8	79.1	78.6	78.5	77.6	76.9	76.2	75.5	78.7
Santiago de Cuba...	73.3	72.9	72.5	72.4	71.9	71.8	73.7	76.0	80.3	82.7	85.4	86.4	86.6	86.0	84.8	82.6	80.3	78.6	77.3	76.5	75.7	75.0	74.5	74.1	78.0
Santo Domingo, S. D.	72.4	72.0	71.6	71.1	71.0	70.9	72.9	76.7	79.9	82.3	83.4	83.0	83.1	82.9	81.9	80.7	79.3	77.8	76.6	75.6	74.6	73.8	73.5	72.7	76.6
Willemstad, Curaçao	78.4	78.2	78.0	77.7	77.6	77.8	79.7	81.1	81.8	82.7	82.2	82.9	83.2	83.3	83.1	82.2	80.7	80.1	79.9	79.7	79.7	79.5	79.2	79.0	80.3

TABLE IV.—*Mean pressure for each hour of seventy-fifth meridian time, November, 1900.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midn't.	Mean.
Bismarck, N. Dak....	28.322	.321	.322	.325	.323	.326	.331	.331	.340	.344	346	.346	.335	.321	.310	.307	.307	.310	.314	316	317	321	.321	.322	324
Boston, Mass........	29.875	.872	.867	.862	.863	.868	.875	.885	.884	.883	.869	.848	838	.832	.833	.839	848	.857	.863	.867	870	872	.872	.865	.863
Buffalo, N. Y........	29.165	.165	.170	.170	165	.167	.171	.173	.172	.172	.168	.152	.136	.131	.100	.130	.139	146	154	.157	164	165	.165	.165	157
Cedar City, Utah....	24.341	.342	.341	.341	.339	.337	.334	.335	343	.352	.364	.370	.371	.355	.336	.322	.314	315	315	.319	325	.332	337	338	338
Chicago, Ill.	29.172	.165	.165	.160	.159	.158	.161	.170	.173	.176	.181	.187	.169	.161	.157	.158	.168	.177	.183	.190	.192	.192	.189	.187	172
Cincinnati, Ohio	29.420	.419	.420	.418	.418	.421	.429	.433	.443	.449	.447	.436	.415	.409	.406	.406	.413	.419	.425	.426	.430	432	429	.429	.425
Cleveland, Ohio	29.206	.205	.201	.203	.204	.209	.212	.214	.217	.216	.210	196	.182	.179	.181	.183	.182	.202	209	.214	213	212	211	210	205
Detroit, Mich........	29.234	.233	.230	.226	.223	.223	.225	.229	.230	.229	.229	218	.207	.196	.196	.203	212	.219	226	.241	244	236	.246	.247	.223
Dodge, Kans	27.485	.487	.488	.493	.492	.490	490	.491	.497	.503	.510	.508	490	.465	446	434	.433	.434	.445	.461	470	477	.489	.484	.477
Eastport, Me	29.891	.891	.885	.883	.881	.885	894	.901	.904	.904	.892	.883	.870	.865	.868	871	.877	.884	889	895	894	890	.884	879	.886
Galveston, Tex.......	30.044	.040	.038	.035	.036	.038	.049	.058	.067	.075	.079	.070	.051	.023	.007	000	.001	.004	.017	028	.041	.048	.053	054	.040
Havre, Mont..........	27.425	.425	.427	.428	.426	.422	.418	.415	.413	.414	.417	.421	.422	.409	.394	.392	.390	.391	397	399	400	406	.411	415	412
Independence, Cal ..	26.054	.058	.061	.061	.062	.060	.056	.058	.065	.072	.080	.086	.093	.087	.066	.046	.032	025	025	026	032	.037	.047	053	056
Kalispell, Mont	27.002	.007	.006	.008	.008	.004	.001	.997	.002	.007	.012	.016	.015	.005	.992	.983	.977	.978	980	983	988	.991	.997	.999	.998
Kansas City, Mo.....	29.107	.104	.103	.105	.105	.103	.103	.116	.126	.136	.145	.146	.128	.113	.097	.088	.090	.089	097	.101	109	110	111	.112	.110
Key West, Fla.......	30.033	.027	.018	.014	.012	.020	.031	.049	.056	.062	.063	.058	.032	.012	.998	.993	.995	000	007	.022	.033	.038	040	036	.027
Marquette, Mich ...	29.210	.212	.210	.207	.206	.205	.207	.207	.211	.215	.219	.214	.201	.197	.203	.207	.219	.227	.232	.241	231	232	.229	226	.215
Memphis, Tenn......	29.715	.715	.719	.719	.718	.723	.733	.748	.759	.768	.779	.771	.752	.730	.717	.709	.707	.706	.708	.713	.716	.716	.720	721	.728
Mt. Tamalpais, Cal .	27.573	.575	.574	.571	.570	.566	.567	.564	.567	.577	.588	.598	.607	.602	.590	.579	.574	.565	.562	.565	.568	.573	.573	578	576
New Orleans, La.....	30.064	.062	.062	.063	.062	.073	.083	.095	.106	.110	.110	.102	.079	.061	.042	.047	.038	.041	052	.059	.069	073	071	070	070
New York, N. Y.....	29.688	.690	.687	.684	.682	.688	.698	706	.708	.706	.692	.676	.660	.652	.653	.652	.663	.670	680	682	687	.687	687	683	.682
Philadelphia, Pa.....	29.927	.931	.925	.924	.924	.933	.942	.946	.950	.948	.935	.920	.904	.896	.894	898	.905	.914	.919	924	925	926	923	924	923
Pittsburg, Pa........	29.151	.148	144	.141	.138	.141	.145	148	.152	.154	.151	.136	.121	.105	.109	.114	.130	129	.139	142	147	148	147	151	138
Portland, Oreg......	29.856	.860	.862	.861	.863	.862	.855	.857	.860	.868	.879	.886	.893	.894	.887	.875	.863	859	.856	854	856	859	.863	867	866
St. Louis, Mo........	29.493	.492	.493	.490	.491	.497	.504	.512	.524	532	.536	.530	.509	493	.479	.473	.474	478	486	491	494	.497	501	500	499
St. Paul, Minn.......	29.174	.174	.176	.179	.180	.182	.184	.187	.194	.200	.203	.209	.199	188	.180	177	.178	.180	.184	188	188	189	.186	.187	.186
Salt Lake City, Utah.	25.705	.707	.707	.707	.710	.709	.707	.706	.710	.716	.724	728	.734	.722	.707	.696	.687	.686	.687	688	693	694	.700	703	705
San Diego, Cal.......	29.890	.891	.889	.887	.884	.881	.876	.879	.885	.895	.905	915	918	910	885	.870	.859	.854	853	.856	865	873	.879	.886	883
San Francisco, Cal...	29.898	.899	.896	.892	.892	.888	.887	.887	.895	.904	.914	.923	.932	.927	.913	.900	.889	.883	.879	879	.884	.890	.893	.898	.898
Santa Fe, N. Mex ...	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Savannah, Ga........	30.048	.045	.043	.041	.045	.053	.064	.076	.085	.088	.079	060	.035	.019	.012	.009	.011	.016	.028	.033	.043	.047	.051	.050	.045
Washington, D. C....	29.949	.950	.948	.948	.952	.957	.966	.977	.982	.984	.976	.954	.932	.919	.916	.918	.922	.931	.936	.939	.941	.942	.944	.947	.947
West Indies.																									
Basseterre, St. Kitts.	29.873	.862	.856	.859	.873	.889	.908	.931	.925	.914	.894	.871	.854	.847	.845	.852	.842	.872	.886	.896	.902	.899	.892	.885	.881
Bridgetown, Bar.....	29.848	.838	.839	.842	.850	.863	.881	.892	.897	.888	.867	843	.825	.817	.817	.830	.828	.839	.851	.863	.867	.867	.864	.857	.853
Cienfuegos, Cuba ...	29.932	.923	.916	.916	922	.943	.947	.959	.971	.971	.952	.931	907	.890	.883	.885	.893	.905	.925	.938	.947	.950	.948	.940	928
Havana, Cuba........	29.965	.955	.947	.945	.948	.957	.971	.984	.995	.000	.994	.980	.956	.937	.927	925	.929	.947	.948	.962	.975	.980	980	971	.961
Kingston, Jamaica..	29.626	.609	.598	.596	.600	.611	.630	.642	.656	.653	.634	613	.582	.563	.551	.551	.564	.578	.597	.614	.632	.639	.638	632	.609
Port of Spain, Trin..	29.811	.804	.806	.813	.831	.849	.869	.876	.873	.859	.831	809	.788	.777	775	.781	.792	.805	.830	.834	.840	.838	832	.823	.822
P. Principe, Cuba ...	29.624	.613	.607	.607	.613	.624	.636	.650	.660	.660	.650	.634	.610	.597	.590	.591	.599	609	.621	.634	.639	.645	641	632	624
Roseau, Dominica ..	29.856	.847	.846	.850	.861	.875	.888	.903	.907	.897	.876	.853	.840	.831	.829	.834	844	.855	.864	.874	.878	.879	875	865	.864
San Juan, P. R......	29.843	.834	.827	.834	.845	.857	.869	.881	.889	.878	.863	.843	.824	.809	.802	.811	821	833	.847	.858	.865	865	858	850	.846
Santiago de Cuba....	29.848	.837	.828	.831	.840	.851	.862	.871	.881	.877	.859	.830	.802	.787	.781	.787	802	.812	.831	.850	.864	868	864	.856	838
Santo Domingo, S. D.	29.883	.870	.861	.859	.874	.890	.905	.918	.928	.918	.902	.878	.851	.837	.831	.832	.845	.856	.872	.891	.901	.903	.898	.890	.879
Willemstad, Curaçao	29.764	.754	.750	.755	.770	.787	.809	.822	.823	.810	.787	.759	.729	.711	.705	.707	.717	.730	.757	.775	.789	.791	.787	.776	.765

TABLE V.—*Average wind movement for each hour of seventy-fifth meridian time, November, 1900.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Abilene, Tex	7.3	6.7	6.5	6.5	6.3	6.2	5.6	5.7	5.3	5.8	7.0	8.0	8.8	9.5	10.2	10.8	10.2	9.7	7.6	5.9	5.9	6.3	6.8	6.6	7.3
Albany, N. Y	7.6	7.3	7.2	7.6	7.8	7.6	7.3	8.0	8.5	9.3	10.2	10.4	10.4	10.4	10.4	9.8	9.8	8.6	7.6	7.6	8.3	8.4	7.9	7.6	8.5
Alpena, Mich	8.8	8.3	8.2	8.6	8.3	8.3	8.3	8.2	8.8	9.9	11.4	11.7	12.4	12.7	13.0	12.8	12.0	10.9	9.3	9.3	9.3	8.7	9.1	8.8	9.9
Amarillo, Tex	13.4	13.0	12.8	12.2	12.0	13.8	12.8	13.2	12.6	12.9	14.7	17.5	19.8	18.8	18.2	16.5	16.5	15.5	13.0	11.2	11.1	11.6	11.6	12.4	14.0
Atlanta, Ga	11.3	11.1	10.7	10.5	11.0	11.2	10.9	10.9	10.6	10.7	11.0	11.3	11.4	11.6	12.0	12.3	11.9	9.8	10.3	10.9	11.1	11.6	11.1	11.0	11.1
Atlantic City, N. J	11.4	11.3	11.7	11.6	11.8	11.9	11.6	11.5	13.3	14.4	14.3	13.7	13.9	13.8	13.2	13.1	12.5	11.6	12.4	12.7	12.5	12.7	12.4	11.5	12.5
Augusta, Ga	4.4	4.2	4.4	4.2	4.0	4.3	4.4	4.4	5.3	6.4	6.8	7.7	9.4	9.3	9.5	8.7	7.7	5.5	5.8	5.5	5.0	4.2	4.6	4.0	5.8
Baker City, Oreg	6.3	6.4	6.3	6.6	7.3	6.4	6.2	6.8	5.6	6.2	6.5	5.8	4.4	4.7	4.5	4.4	4.9	4.7	3.5	4.1	4.3	4.9	5.9	5.7	5.5
Baltimore, Md	4.1	4.2	4.4	4.8	4.4	3.8	3.9	4.4	5.1	5.8	6.0	6.6	7.1	7.1	7.4	6.5	6.3	5.2	4.4	4.7	4.7	4.4	4.5	4.1	5.2
Bismarck, N. Dak	6.0	5.8	5.8	5.9	5.9	6.0	6.1	6.1	6.4	6.9	8.5	10.1	11.4	11.5	11.7	12.2	11.0	9.1	7.5	7.3	6.9	6.2	6.1	5.3	7.7
Block Island, R. I	20.2	20.5	20.1	21.3	21.6	21.3	20.9	20.0	20.4	21.1	21.2	20.9	20.3	19.8	19.8	19.1	18.8	19.7	19.9	20.2	20.3	20.4	20.2	19.9	20.3
Boise, Idaho	3.0	3.2	3.3	3.1	3.0	3.1	3.6	3.1	3.1	2.9	2.7	2.9	3.3	3.7	4.4	4.0	3.7	3.3	3.5	2.9	2.8	3.1	3.1	3.1	3.2
Boston, Mass	10.9	11.0	11.3	11.3	11.7	11.6	12.7	12.6	13.3	13.5	13.8	14.0	14.5	14.3	13.4	12.9	11.7	11.6	11.4	10.9	10.6	11.2	11.4	11.2	12.2
Buffalo, N. Y	16.6	15.5	15.7	15.9	16.0	16.1	16.4	15.6	16.3	17.0	19.0	18.4	19.2	20.2	19.8	19.3	18.8	18.1	18.6	18.5	18.3	18.2	17.9	17.0	17.6
Cairo, Ill	8.2	8.1	8.3	8.6	9.0	9.1	9.5	8.7	9.4	9.8	11.4	11.0	11.4	11.0	10.5	10.4	10.2	8.9	8.0	8.0	8.3	8.7	8.5	8.1	9.3
Cape Henry, Va	15.1	15.9	16.0	15.6	15.7	15.1	15.8	16.3	15.6	15.4	14.9	14.5	15.7	15.5	14.6	13.5	12.2	11.1	12.1	13.0	14.3	14.6	15.1	15.0	14.7
Carson City, Nev	4.3	4.7	4.4	4.9	5.2	5.3	4.9	6.4	5.5	4.9	4.7	3.9	4.3	5.0	6.5	9.2	10.2	11.2	9.9	8.2	7.6	5.8	4.9	4.4	6.1
Cedar City, Utah	6.9	6.2	6.1	5.7	6.2	5.3	5.0	4.7	4.8	4.9	4.4	3.7	4.7	5.4	6.1	6.8	7.0	7.4	6.2	6.0	7.2	7.1	7.8	6.7	5.9
Charleston, S. C	9.7	9.4	9.3	8.8	9.2	9.1	8.7	9.3	9.4	10.0	10.2	10.7	11.4	11.5	12.4	11.6	10.8	9.6	9.1	9.6	8.7	8.6	9.4	8.9	9.8
Charlotte, N. C	6.7	6.8	6.5	6.1	6.0	5.4	5.3	5.5	5.8	6.9	7.6	8.0	8.3	9.0	9.0	8.9	7.5	6.2	6.2	6.2	6.5	6.6	6.6	6.4	6.8
Chattanooga, Tenn	6.1	6.2	6.1	6.6	6.1	5.4	5.1	5.3	5.5	5.6	6.8	7.9	8.8	9.1	9.6	10.3	9.8	8.3	7.2	7.1	6.3	5.9	5.9	6.2	7.0
Cheyenne, Wyo	9.9	9.8	9.2	9.1	9.2	9.3	9.7	10.6	8.9	9.4	9.3	11.5	14.5	14.5	16.3	14.5	14.1	13.2	10.8	9.2	9.2	9.4	9.4	9.3	10.8
Chicago, Ill	17.4	16.9	16.9	17.7	18.0	18.2	18.2	18.5	17.8	17.7	18.0	17.4	17.7	17.3	17.5	17.9	17.4	16.5	16.6	16.4	16.8	17.3	17.9	17.1	17.5
Cincinnati, Ohio	7.0	6.8	7.2	6.9	7.3	7.0	7.1	7.1	8.4	10.2	11.1	12.1	13.9	12.9	12.4	11.8	11.2	9.8	9.1	8.1	7.5	7.0	7.7	7.1	9.0
Cleveland, Ohio	16.9	16.8	16.8	17.2	17.8	18.0	18.9	20.3	19.8	19.5	21.0	21.2	21.2	21.3	20.2	20.3	19.3	17.4	17.9	17.2	16.1	16.7	16.9	17.1	18.6
Columbia, Mo	7.8	7.6	7.6	7.9	7.8	7.7	7.7	7.7	7.4	8.7	9.4	10.4	10.9	11.1	11.0	11.3	10.3	8.9	8.2	7.7	8.1	7.8	7.7	7.7	8.7
Columbus, Ohio	7.6	7.6	7.4	7.5	7.9	7.9	7.7	7.9	8.4	9.8	11.5	11.6	12.3	12.0	11.8	11.5	10.6	9.1	8.5	8.4	8.0	7.9	7.7	7.8	9.1
Concordia, Kans	4.9	5.1	4.9	4.9	5.0	4.6	5.0	5.0	4.9	6.0	6.5	7.1	8.3	7.8	8.3	8.1	7.3	6.0	4.6	4.6	4.7	5.2	5.0	4.7	5.8
Corpus Christi, Tex	10.6	10.5	10.5	10.1	9.7	9.6	9.7	9.2	8.9	9.7	10.4	11.0	11.7	12.2	13.0	13.8	13.9	13.5	12.5	11.9	11.9	11.9	10.9	11.0	11.2
Davenport, Iowa	6.9	7.0	7.2	7.0	6.8	7.3	7.1	7.1	7.4	7.7	8.2	8.9	9.0	9.5	9.2	9.7	9.0	7.7	7.2	6.6	6.3	6.0	5.8	5.9	7.5
Denver, Colo	7.7	7.5	7.8	7.7	7.8	7.4	7.9	7.7	7.6	7.5	7.0	7.3	8.3	8.4	7.9	8.3	8.7	8.5	8.4	7.3	6.5	7.3	8.9	8.9	7.8
Des Moines, Iowa	6.3	6.2	6.1	6.7	6.4	6.6	6.5	6.8	7.0	7.8	8.0	8.2	9.4	9.5	9.7	10.0	9.1	7.7	6.4	5.5	5.3	5.3	5.4	5.6	7.1
Detroit, Mich	11.1	11.2	11.1	11.1	11.7	11.9	11.6	12.2	13.2	14.6	15.0	15.1	15.2	15.3	14.4	14.7	13.5	11.9	10.8	11.1	11.0	11.6	11.3	11.3	12.6
Dodge, Kans	6.1	6.6	7.6	8.3	8.4	8.2	8.3	8.7	9.6	10.1	11.0	11.2	11.2	11.2	11.6	11.1	10.5	9.0	7.1	6.6	6.1	5.7	5.7	5.5	8.6
Dubuque, Iowa	6.6	6.8	7.0	7.3	7.2	6.8	6.6	6.2	6.4	7.3	8.2	8.7	9.5	9.6	10.1	9.4	8.8	7.7	7.1	7.4	7.1	6.8	7.0	6.6	7.6
Duluth, Minn	11.1	11.0	10.5	10.2	10.6	10.8	10.0	9.6	9.4	9.6	10.4	10.8	11.3	10.9	11.0	10.9	10.7	9.5	9.7	10.4	10.1	9.5	10.3	10.8	10.4
Eastport, Me	11.3	11.5	11.9	12.5	11.6	12.3	13.1	13.5	13.1	13.6	14.3	14.5	14.8	14.1	14.5	14.0	14.0	13.7	13.9	13.2	12.4	12.5	12.3	11.9	13.1
Elkins, W. Va	4.7	4.6	4.7	4.6	4.6	4.2	4.2	4.0	5.4	5.5	6.8	7.2	8.1	7.9	8.1	7.4	6.3	5.4	4.5	4.3	4.7	5.0	5.0	4.9	5.5
El Paso, Tex	7.3	7.0	7.0	7.2	7.4	7.2	7.3	6.9	6.2	5.7	6.1	7.9	9.3	9.2	9.3	10.7	10.7	10.6	9.4	7.5	6.3	6.5	6.9	7.2	7.8
Erie, Pa	14.2	14.5	13.9	13.8	13.7	13.8	14.2	14.9	14.0	14.9	14.8	14.8	16.3	16.3	15.9	15.7	14.8	14.3	14.2	14.9	15.0	14.6	14.5	13.7	14.7
Escanaba, Mich	8.2	8.5	8.3	7.9	8.0	7.9	8.0	8.6	9.0	10.0	11.0	11.3	11.6	11.6	11.3	11.1	10.8	9.9	9.7	9.5	8.9	8.4	8.2	8.1	9.4
Eureka, Cal	4.5	4.6	4.3	4.0	3.7	3.6	3.5	3.3	3.5	3.1	3.0	2.8	3.0	3.9	4.5	4.9	5.0	5.3	5.0	4.9	4.5	4.2	4.1	3.9	4.0
Evansville, Ind	7.5	7.3	7.2	7.6	7.4	8.5	8.4	8.3	8.9	9.7	10.4	10.4	11.7	11.1	11.3	11.1	10.0	8.6	7.6	7.6	7.5	7.4	7.5	6.9	8.7
Fort Smith, Ark	7.3	7.4	7.3	7.1	7.4	7.1	6.5	6.9	7.0	6.6	6.8	8.4	9.1	9.4	9.4	9.4	8.9	8.2	6.9	7.2	7.0	6.6	6.7	6.5	7.5
Fort Worth, Tex	9.3	8.7	9.7	9.5	9.4	8.9	8.7	8.7	9.1	9.6	10.6	11.0	11.8	11.4	11.9	12.6	13.1	11.0	9.8	10.5	10.4	10.6	10.4	9.6	10.3
Fresno, Cal	4.4	4.1	3.8	3.8	4.2	4.3	4.0	4.5	4.3	4.1	3.9	4.2	4.3	4.6	4.9	4.6	4.7	4.7	4.5	3.9	4.0	4.4	4.4	4.2	4.3
Galveston, Tex	9.4	9.9	9.8	9.2	9.6	9.2	8.9	9.7	9.5	9.8	10.0	10.1	10.0	9.8	9.6	9.4	9.2	9.5	9.5	9.8	9.7	10.2	10.2	9.6	9.6
Grand Haven, Mich	13.5	13.4	13.4	13.2	12.7	13.1	14.3	13.6	13.6	13.1	13.6	14.4	15.0	14.8	15.2	14.9	13.9	13.7	13.2	13.5	12.9	13.5	13.3	12.8	13.7
Grand Junction, Colo	4.4	4.1	3.7	4.0	3.6	3.9	4.2	4.6	4.9	4.4	5.4	6.3	6.8	5.7	4.9	4.4	4.9	5.3	5.0	3.8	4.1	3.8	3.7	4.3	4.6
Green Bay, Wis	7.8	7.4	7.2	7.5	7.2	7.5	7.5	7.3	8.1	9.1	9.6	10.3	11.3	12.0	12.2	11.8	10.3	9.1	8.7	9.2	9.1	8.7	8.2	7.4	8.9
Harrisburg, Pa	7.1	7.1	7.0	6.5	7.3	6.5	6.7	6.5	7.1	7.9	9.0	9.5	9.6	10.9	10.6	10.4	9.0	8.1	7.9	8.0	7.9	7.6	7.8	7.4	8.0
Hatteras, N. C	15.4	16.0	16.5	15.7	16.1	15.5	14.9	15.0	14.9	15.0	14.2	13.9	14.7	14.7	13.4	14.1	13.8	13.6	14.2	14.9	15.1	15.0	15.2	15.5	14.9
Havre, Mont	9.4	9.8	9.4	9.2	8.9	8.7	8.4	8.8	9.4	9.5	9.8	10.4	12.1	12.9	13.0	13.1	12.5	10.8	9.1	8.7	9.6	10.0	10.1	9.9	10.2
Helena, Mont	5.9	6.1	5.4	6.2	5.4	5.9	5.4	4.9	4.6	5.1	4.7	4.2	5.6	7.1	8.4	8.4	8.2	8.3	7.8	7.1	7.8	8.2	7.6	6.1	6.4
Huron, S. Dak	9.8	9.6	9.6	9.3	9.5	9.4	9.4	9.0	9.5	8.8	9.4	10.2	10.2	11.4	12.1	11.7	12.1	11.1	9.8	9.9	10.2	9.8	10.3	10.1	10.1
Independence, Cal	5.3	5.7	5.9	6.3	6.7	6.8	5.9	6.3	6.5	5.9	6.3	6.6	7.5	7.6	6.9	6.4	7.3	7.7	7.2	7.3	7.1	5.9	5.7	5.4	6.5
Indianapolis, Ind	10.2	10.5	9.8	10.3	11.2	10.9	11.5	11.7	12.4	12.9	14.7	14.7	14.8	14.5	14.7	14.3	13.4	11.6	10.4	10.1	10.6	10.5	10.4	9.5	11.9
Jacksonville, Fla	5.1	5.7	5.6	5.8	5.5	5.3	5.4	5.5	5.7	6.2	7.1	7.5	8.3	8.6	9.1	9.1	7.9	6.7	6.1	5.4	5.1	5.3	5.1	5.1	6.3
Jupiter, Fla	9.6	9.7	9.1	9.1	8.9	9.1	9.5	9.3	10.6	11.4	12.0	11.9	11.7	12.6	12.0	11.6	10.6	10.2	9.8	9.9	9.1	8.5	9.4	9.7	10.2
Kalispell, Mont	5.1	5.4	5.0	4.5	4.4	4.6	4.3	4.7	4.8	4.7	4.8	4.0	4.5	4.3	4.6	5.1	5.4	5.8	5.8	5.3	5.6	5.4	5.3	4.9	4.9
Kansas City, Mo	7.2	7.6	7.7	7.7	8.0	7.6	7.8	8.0	8.4	8.6	8.8	9.2	9.1	9.9	10.1	10.4	9.7	9.4	8.2	8.2	8.0	7.6	7.4	7.4	8.4
Keokuk, Iowa	7.7	8.0	7.8	7.9	7.9	7.8	7.4	7.1	7.1	7.6	8.6	9.3	9.3	9.8	9.6	9.5	8.9	8.0	7.1	7.1	6.8	6.6	6.5	6.1	7.9
Key West, Fla	10.7	10.5	10.9	10.6	10.8	10.7	11.0	11.8	12.2	12.6	13.1	12.5	12.9	12.2	12.2	11.8	11.1	10.2	10.0	10.0	10.3	10.1	10.2	10.7	11.2
Kittyhawk, N. C	15.6	15.9	15.5	14.9	15.3	15.6	15.5	15.5	15.6	15.8	15.6	15.7	15.8	15.5	15.2	15.2	15.2	14.2	13.7	14.1	13.9	14.0	13.0	15.4	15.1
Knoxville, Tenn	6.5	6.1	6.2	6.4	5.6	5.3	5.4	5.2	4.9	6.3	6.7	7.9	9.2	9.4	9.3	8.9	8.6	8.0	7.3	6.1	6.5	6.2	5.8	5.5	6.8
La Crosse, Wis	6.1	6.3	6.2	6.4	6.2	6.1	6.3	5.7	5.7	6.2	7.1	7.6	8.4	7.8	8.0	8.4	8.2	7.4	6.5	6.1	6.6	6.2	6.4	6.0	6.8
Lander, Wyo	2.8	2.5	2.8	2.5	2.0	2.1	2.1	1.8	1.6	1.9	1.5	2.3	2.5	3.1	2.7	3.1	3.4	4.1	3.3	3.9	3.8	3.6	3.0	2.8	2.7
Lexington, Ky	10.1	10.3	10.0	10.3	10.1	10.7	10.4	10.4	11.6	12.6	13.6	14.1	15.5	14.3	13.6	13.3	11.8	10.5	10.5	10.7	10.8	10.7	11.1	10.4	11.6
Little Rock, Ark	6.9	6.7	6.6	6.2	5.8	6.2	6.0	6.7	6.5	6.7	7.7	7.8	8.0	8.1	7.4	7.2	7.4	6.2	5.5	5.4	5.8	5.9	6.1	6.4	6.6
Los Angeles, Cal	3.4	3.6	3.2	3.3	3.8	3.9	3.9	4.2	3.8	4.0	4.0	4.0	4.2	4.5	4.8	5.1	5.7	6.5	6.4	5.2	3.8	2.5	2.3	2.9	4.1
Louisville, Ky	7.6	7.5	7.5	7.7	8.0	8.1	9.0	9.2	9.7	10.4	11.6	12.3	12.5	12.1	11.9	11.6	11.6	10.2	8.8	9.0	8.8	8.6	8.3	7.8	9.6
Lynchburg, Va	3.6	3.9	4.4	4.4	3.3	4.0	4.2	4.2	4.8	5.6	5.3	6.0	5.6	5.8	6.2	6.4	5.4	4.2	3.8	3.4	3.0	2.8	3.1	3.1	4.4
Macon, Ga	4.5	4.6	4.1	4.3	4.4	5.2	5.1	4.8	6.1	7.2	7.7	7.5	8.1	8.2	8.0	8.6	8.1	6.0	5.3	5.4	5.1	5.8	5.1	4.7	6.0
Marquette, Mich	9.8	9.6	9.6	10.0	10.1	10.5	10.2	11.2	11.2	12.0	11.6	11.8	12.3	12.1	11.6	11.4	10.3	9.5	9.0	9.9	9.6	10.3	9.7	9.3	10.5
Memphis, Tenn	10.4	10.8	10.7	10.1	9.6	10.2	9.7	10.1	10.1	10.5	10.6	10.3	10.9	10.6	10.4	9.7	9.6	8.8	8.6	8.8	9.2	10.3	10.3	10.4	10.0
Milwaukee, Wis	11.1	11.1	11.1	11.3	11.8	10.8	11.5	11.7	12.1	11.3	11.4	12.3	12.6	11.8	11.8	11.9	10.5	10.0	10.1	9.9	10.8	11.2	10.7	10.2	11.2
Mobile, Ala	6.4	7.1	6.9	6.8	6.3	6.2	6.6	6.4	7.0	7.7	8.5	8.7	9.2	8.9	9.1	9.2	8.5	7.6	6.7	6.4	6.7	6.5	6.8	6.1	7.3
Montgomery, Ala	5.6	5.6	5.2	5.0	5.0	4.7	4.9	4.9	5.4	6.7	7.5	7.6	8.4	7.7	7.4	7.5	7.4	6.2	5.8	5.6	5.6	5.9	6.2	5.8	6.2
Moorhead, Minn	8.9	9.8	9.7	9.3	9.7	9.4	9.7	9.3	8.8	9.1	9.9	10.0	10.6	11.3	11.6	11.5	11.3	10.6	9.3	9.6	9.6	8.9	9.3	9.1	9.8
Mount Tamalpais, Cal	15.8	17.0	16.9	17.5	17.5	17.6	18.0	18.1	19.1	19.4	18.7	17.4	16.3	15.6	14.8	12.5	12.0	11.6	12.9	14.3	16.2	16.6	16.5	15.5	16.2
Nantucket, Mass	14.4	14.8	15.5	15.8	15.7	15.7	15.2	15.3	15.9	15.9	15.8	15.5	14.7	14.9	14.9	14.6	13.9	13.9	13.8	14.6	14.6	14.2	14.4	14.4	14.9
Nashville, Tenn	5.5	5.4	5.2	5.3	5.3	5.0	5.1	5.9	7.0	8.0	8.8	9.0	9.0	9.0	8.8	9.1	8.5	7.1	6.4	5.6	5.4	5.4	5.3	5.0	6.7
Neah Bay, Wash	7.5	7.1	7.6	7.4	7.7	8.7	8.2	9.0	9.2	9.4	9.9	10.6	10.7	10.7	11.1	10.7	10.3	10.1	9.4	8.6	8.2	7.4	7.7	7.8	9.0
New Haven, Conn	10.2	10.5	10.2	10.4	10.0	9.7	9.2	9.0	10.4	10.5	11.4	12.7	12.8	13.3	12.7	12.2	10.8	10.0	10.2	9.9	9.9	9.8	10.0	10.3	10.7
New Orleans, La	7.5	7.3	7.5	7.8	7.9	7.5	7.6	7.0	7.8	8.4	9.6	9.3	10.2	9.5	9.2	9.8	9.3	8.2	7.6	8.1	7.8	7.7	8.4	8.1	8.3

TABLE V.—*Average wind movement, etc.*—Continued.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
New York, N. Y.	14.9	14.2	14.4	14.4	15.0	14.8	13.8	13.3	14.4	15.5	16.4	17.0	17.5	17.7	17.4	16.7	17.6	17.3	16.5	17.6	18.7	16.5	15.4	15.4	15.9
Norfolk, Va.	10.0	9.9	9.7	9.5	9.6	9.4	9.1	8.9	9.6	10.2	11.0	11.3	11.8	11.6	11.6	10.8	10.3	10.2	9.8	9.4	9.9	10.3	9.7	9.4	10.1
Northfield, Vt.	10.0	10.1	10.2	10.1	9.7	8.5	7.8	8.0	9.4	9.3	10.3	11.4	11.7	12.3	11.9	10.8	8.7	8.6	8.8	10.4	10.3	10.3	9.6	8.9	9.9
North Platte, Nebr.	6.1	6.4	6.6	6.8	6.4	6.6	6.2	6.4	6.0	7.0	7.7	8.2	9.3	9.5	9.3	9.8	9.6	8.8	7.0	6.3	6.2	7.4	7.4	7.0	7.4
Oklahoma, Okla.	7.4	7.5	7.6	7.7	7.3	7.0	6.8	7.3	7.1	8.2	9.5	10.4	11.3	11.1	11.7	11.4	11.1	9.2	7.7	7.2	7.2	7.4	7.9	7.8	8.5
Omaha, Nebr.	8.8	8.2	7.8	8.2	8.2	7.6	7.7	7.5	7.1	7.3	8.7	9.3	10.3	10.5	10.2	10.1	9.6	7.9	7.0	7.1	7.3	7.2	7.5	7.8	8.3
Oswego, N. Y.	14.3	13.9	13.7	13.9	13.9	13.0	12.9	12.3	12.2	12.5	13.0	12.4	13.2	13.3	14.0	13.9	13.8	13.0	13.6	14.0	13.6	13.3	13.9	13.8	13.4
Palestine, Tex.	7.8	7.8	7.7	7.5	7.6	7.0	6.6	6.4	6.2	7.2	8.4	8.9	9.6	9.6	9.8	9.7	9.2	8.7	7.2	6.7	6.5	7.5	7.5	7.5	7.9
Parkersburg, W. Va.	6.2	6.2	6.2	5.9	5.8	5.3	5.6	6.0	6.2	6.9	7.6	8.7	10.5	9.9	9.5	9.0	8.2	7.0	6.2	6.1	6.8	6.7	6.8	6.3	7.1
Pensacola, Fla.	8.5	8.6	8.3	8.3	8.5	8.4	8.5	8.0	7.7	9.0	9.5	9.4	9.3	9.6	9.7	9.4	8.7	7.8	7.4	7.3	7.5	7.8	7.9	8.4	8.5
Phoenix, Ariz.	3.4	3.1	3.0	3.3	3.2	3.4	3.2	3.4	3.2	3.5	3.2	3.4	5.3	5.2	5.5	5.0	4.8	4.2	3.0	2.5	2.6	2.5	2.8	3 1	3.6
Philadelphia, Pa.	10.3	9.9	10.5	10.5	10.0	9.3	9.5	10.0	10.7	11.2	12.5	12.5	12.9	12.7	13.5	12.1	11.6	11.5	11.3	10.7	11.0	10.8	9.9	10.0	11.0
Pierre, S. Dak.	5.9	5.6	5.2	5.2	5.3	5.7	5.9	5.1	5.6	5.8	6.4	7.6	8.0	8.2	9.3	9.7	10.0	8.3	7.4	7.4	7.3	6.7	6.0	5.4	6.8
Pittsburg, Pa.	7.1	6.5	6.6	6.8	7.0	7.3	7.1	7.1	7.0	7.4	8.4	8.7	8.9	9.0	8.7	8.4	7.4	7.7	7.2	6.9	6.3	6.4	6.5	6.3	7.4
Pocatello, Idaho	9.3	9.5	9.2	9.1	9.8	9.0	9.5	9.1	8.8	8.5	9.4	10.2	10.1	9.4	9.3	9.3	9.1	9.1	8.3	7.0	8.0	9.3	9.6	9.8	9.2
Point Reyes Lt., Cal.	10.7	9.8	9.4	9.3	8.7	8.6	8.6	9.2	9.0	7.9	7.7	7.1	6.8	7.1	7.0	7.8	8.2	8.5	8.6	9.7	10.7	11.1	11.4	11.0	8.9
Port Crescent, Wash.	2.7	3.1	3.0	3.7	4.0	3.4	3.1	3.5	3.3	3.2	3.7	3.5	3.4	4.2	4.7	4.3	4.6	4.0	3.5	3.5	2.7	2.8	2.9	3.0	3.5
Port Huron, Mich.	11.6	12.1	11.8	12.2	12.7	12.7	12.8	12.8	13.0	14.0	14.9	15.4	15.4	15.2	15.1	14.5	13.5	12.1	11.6	11.4	11.7	11.6	11.2	11.3	12.9
Portland, Me.	7.4	7.5	7.9	7.6	8.0	8.1	7.9	8.4	9.8	9.3	9.9	9.8	9.3	10.6	10.4	7.6	8.4	7.5	7.8	6.7	7.2	7.3	7.4	7.5	8.4
Portland, Oreg.	9.4	9.8	9.7	9.1	8.9	8.9	9.6	9.2	8.8	8.9	8.4	8.5	8.6	9.4	9.8	9.6	9.3	9.3	9.2	8.7	8.6	8.4	8.4	9.3	9.1
Pueblo, Colo.	5.7	5.8	6.4	5.6	5.3	5.5	5.4	4.6	4.8	4.2	4.7	5.1	5.9	6.8	7.2	6.9	7.5	8.4	8.2	7.4	6.4	6.5	6.8	5.9	6.1
Raleigh, N. C.	5.5	5.4	5.3	5.5	5.4	4.8	5.1	5.4	5.7	6.8	7.9	8.2	8.6	8.0	7.9	7.3	5.9	4.7	5.5	5.5	5.6	5.5	5.7	4.9	6.1
Rapid City, S. Dak.	6.4	7.0	6.9	7.7	8.3	8.6	8.8	8.4	9.1	8.3	8.6	9.6	10.3	11.2	12.2	12.0	10.3	8.4	7.2	6.6	6.6	6.9	6.5	6.2	8.4
Red Bluff, Cal.	3.8	3.9	4.0	4.3	4.0	3.5	3.8	3.9	4.0	3.8	3.8	4.2	5.0	5.4	5.8	6.1	5.5	5.1	4.6	3.6	4.0	4.3	4.5	4.1	4.4
Richmond, Va.	4.9	4.7	4.3	4.6	4.6	4.4	4.8	5.0	5.6	6.5	7.3	7.7	8.2	8.1	8.5	7.8	6.4	5.0	4.7	5.1	5.2	4.9	4.6	4.3	5.7
Rochester, N. Y.	9.2	9.0	8.6	8.9	8.3	8.4	8.0	8.8	8.9	9.0	9.6	9.8	11.0	11.4	11.0	10.1	8.9	8.3	8.3	8.8	9.5	9.2	8.9	8.8	9.2
Roseburg, Oreg.	2.1	2.1	2.1	2.0	2.2	2.3	2.4	2.7	2.7	2.6	3.0	3.2	2.8	3.2	3.6	3.6	4.0	4.1	3.8	3.3	2.7	2.7	2.5	2.6	2.8
Sacramento, Cal.	7.9	8.0	8.3	8.1	7.8	7.3	7.4	7.5	6.8	6.7	7.0	7.2	7.0	7.0	6.7	7.1	7.1	6.9	6.5	6.1	7.0	7.9	8.4	8.0	7.3
St. Louis, Mo.	10.0	10.2	10.5	11.1	10.9	10.6	10.6	11.4	11.5	11.9	11.8	11.7	12.6	12.7	12.7	12.5	12.1	10.4	10.7	10.7	10.5	10.3	10.5	10.2	11.2
St. Paul, Minn.	6.4	6.5	6.1	6.1	6.6	7.1	6.9	7.0	7.0	7.5	8.1	9.3	9.4	9.8	9.8	9.3	8.8	7.7	6.8	7.0	6.3	6.3	6.5	6.5	7.5
Salt Lake City, Utah.	4.0	4.5	4.0	3.7	3.5	3.9	3.7	4.1	4.1	4.4	4.2	4.0	4.5	5.8	7.1	8.0	8.5	8.8	7.4	4.4	4.0	4.4	4.9	3.7	5.0
San Antonio, Tex.	4.9	4.9	4.2	4.4	4.6	4.4	4.4	4.3	4.5	5.4	6.8	7.6	8.7	8.6	8.6	9.1	8.4	7.2	6.0	5.5	5.7	5.8	5.7	5.2	6.0
San Diego, Cal.	4.0	3.7	3.9	4.0	4.2	4.6	4.8	5.0	4 0	4.3	3.9	3.4	5.0	6.6	8.5	10.2	10.1	9.8	8.8	7.3	5.1	4.0	3.8	4.1	5.5
Sandusky, Ohio	9.0	9.8	9.7	10.0	10.1	10.2	9.9	10.4	9.6	10.5	11.6	12.0	12.2	12.1	12.0	11.1	10.4	9.4	8.7	8.7	8.1	9.3	9.6	9.2	10.1
San Francisco, Cal.	7.3	7.7	6.6	6.3	6.2	6.0	5.9	6.1	5.5	5.1	5.2	5.2	6.0	6.5	7.1	7.9	8.4	8.8	8.8	9.2	8.5	7.4	7.0	6.8	6.9
San Luis Obispo, Cal.	3.4	4.0	3.7	4.0	4.4	4.1	3.5	3.8	3.7	3.5	3.2	3.3	4.4	5.1	5.7	6.5	6.7	6.6	6.5	5.2	4.7	4.3	4.1	4.0	4.5
Santa Fe, N. Mex.	4.6	4.0	4.3	4.8	5.4	5.1	5.1	5.5	5.0	5.5	5.7	6.4	8.4	8.8	8.7	8.8	8.5	7.7	5.7	4.4	4.7	4.2	4.1	4.7	5.8
Sault Ste. Marie, Mich.	9.5	9.1	8.6	8.1	8.3	8.2	8.5	8.3	8.4	8.9	9.9	10.3	10.9	11.2	10.9	11.6	11.0	10.4	10.3	10.3	10.3	9.8	9.7	9.0	9.6
Savannah, Ga.	6.6	6.6	6.4	6.4	6.2	6.2	6.2	6.7	7.1	7.7	8.3	8.5	9.1	9.6	9.4	9.6	8.4	6.8	6.6	6.6	6.4	6.4	6.9	6.4	7.3
Seattle, Wash.	4.8	5.4	5.1	5.6	5.5	5.5	5.4	5.7	5.2	5.0	5.3	5.0	5.7	6.1	5.6	5.9	6.4	6.3	6.2	5.8	5.8	5.0	4.7	4.3	5.5
Shreveport, La.	6.0	5.6	5.8	5.8	6.3	6.1	5.8	6.1	6.5	7.2	7.9	7.7	8.2	7.8	8.1	8.7	8.4	7.1	6.3	6.3	6.4	6.6	6.3	5.8	6.8
Sioux City, Iowa	9.7	9.7	9.9	10.0	10.1	10.1	10.2	9.7	10.6	11.3	11.7	11 5	12.4	12.3	13.0	13.2	11.6	10.4	9.6	9.6	9.6	9.5	10.2	10.0	10.7
Spokane, Wash.	4.2	4.1	4.2	4.2	4.1	4.0	4.1	4.3	4.4	4.7	4.8	5.4	5.3	6.0	5.7	6.0	5.7	5.5	5.3	5.2	5.5	4.7	4.6	4.4	4.8
Springfield, Ill.	9.3	9.4	9.3	9.5	9.8	9.7	9.8	10.1	10.0	11.0	11.3	11.9	12.7	13.0	11.9	11.6	10.9	9.7	9.1	8.7	9.0	9.1	9.2	9.0	10.2
Springfield, Mo.	9.8	9.7	9.0	9.0	8.9	8.9	9.1	9.2	9.1	9.4	10.4	11.3	12.2	12.5	12.6	12.1	11.6	10.1	8.8	9.5	9.7	9.9	10.0	10.0	10.1
Tacoma, Wash.																									
Tampa, Fla.	4.2	4.4	4.6	4.5	5.1	5.2	5.1	5.2	6.2	6.6	7.3	7.2	7.3	7.3	6.9	7.0	7.1	5.6	5.4	5.2	5.0	4.9	5.0	4.5	5.7
Toledo, Ohio	10.4	11.2	11.5	11.4	11.6	11.4	11.2	11.6	12.3	13.4	13.8	14.0	13.9	14.0	13.9	13.0	12.4	10.5	9.1	9.8	10.4	10.4	10.8	10.3	11.8
Valentine, Nebr.	8.2	7.6	7.6	8.5	8.0	7.7	7.9	8.2	7.7	8.0	8.8	9.9	10.8	11.2	12.1	12.8	12.5	11.1	9.1	8.5	7.8	8.3	7.7	8.1	9.1
Vicksburg, Miss.	6.9	6.5	6.6	6.6	6.5	6.2	6.3	6.9	7.0	7.1	7.3	7.0	7.6	7.5	7.7	7.6	7.5	6.5	5.8	5.8	5.9	6.9	7.2	7.3	6.8
Walla Walla, Wash.	3.4	3.7	3.9	4.[illegible]	4.5	4.6	4.5	4.3	4.0	4.3	4.4	4.6	4.7	5.1	5.0	5.3	4.8	4.5	4.5	4.3	4.2	3.7	4.0	3.4	4.3
Washington, D. C.	6.0	6.5	6.9	6.6	6.6	6.6	6.3	6.7	7.8	9.0	10.4	10.8	10.7	11.0	10.5	9.4	8.4	7.2	6.5	6.6	7.0	7.3	7.6	7.0	7.9
Wichita, Kans.	7.4	7.0	6.8	7.0	6.8	7.1	6.9	7.3	6.9	8.0	8.7	9.4	10.1	10.1	10.2	10.7	10.4	8.8	7.0	7.0	7.2	7.4	7.3	7.2	8.0
Williston, N. Dak.	7.2	7.1	7.0	6.6	6.9	6.6	6.8	7.3	7.9	7.4	7.8	8.5	10.2	10.3	11.1	11.5	11.0	9.5	8.1	7.7	7.6	7.0	7.2	6.9	8.1
Wilmington, N. C.	7.7	7.3	7.4	7.0	6.7	6 9	6.0	6.5	7.7	8.8	10.0	10.9	10.9	10.9	10.6	10.7	9.7	7.7	7.9	8.0	7.8	8.0	7.6	7.6	8.3
Winnemucca, Nev.	7.8	8.1	8.0	8.8	9.2	9.3	9.0	9.6	9.8	10.6	9.0	9.1	9.9	9.8	9.9	10.7	10.8	10.0	9.2	8.1	7.4	6.8	7.0	7.3	9.0
Yankton, S. Dak.	7.7	7.8	7.0	6.8	6.3	6.6	7.1	6.6	7.1	7.0	7.8	8.1	9.1	8.9	9.0	8.5	7.7	7.2	6.8	6.7	6.6	6.8	7.2	7.3	7.4
West Indies.																									
Basseterre, St. Kitts.	6.6	6.6	6.8	6.8	7.1	6.6	7.0	7.9	8.7	9.3	9.8	9.2	9.1	9.2	8.9	8.3	7.7	7.2	7.1	7.8	7.2	7.3	7.0	6.6	7.7
Bridgetown, Bar.	4.1	4.1	4.5	3.9	4.5	4.6	5.7	9.1	10.3	10.4	11.1	11.3	10.7	10.2	9.4	7.8	5.4	4.0	4.0	3.8	3.9	3.8	4.1	4.0	6.4
Cienfuegos, Cuba	5.6	5.9	5.5	5.6	5.3	5.6	5.5	5.9	7.2	9.4	9.9	9.3	9.4	9.4	9.6	9.9	9.4	7.9	7.1	6.6	6.2	5.7	6.0	6.0	7.2
Havana, Cuba	6.9	7.1	7.2	6.8	6.3	7.0	7.0	7.3	9.2	14.1	15.5	15.1	15.3	16.9	17.6	17.3	17.0	14.7	12.2	11.4	10.0	8.7	7.9	7.6	11.1
Kingston, Jamaica	5.0	4.7	5.0	5.2	5.0	5.3	5.0	4.3	3.4	3.8	5.1	5.7	7.1	7.8	7.8	6.9	5.4	4.1	4.5	4.5	4.5	4.8	4.7	4.8	5.2
Port of Spain, Trin.	1.9	1.8	1.8	1.6	1.6	1.4	1.6	3.4	5.2	6.6	6.8	6.5	6.4	6.2	5.5	4.8	4.0	3.2	2.5	2.3	1.9	2.2	2.0	1.9	3.5
Puerto Principe, Cuba	4.0	3.8	3.9	3.7	4.2	3.7	3.5	4.0	7.8	10.8	10.8	10.7	10.9	11.3	11.4	11.0	9.5	7.2	5.5	5.3	4.8	4.4	4.2	4.0	6.7
Roseau, Dominica	4.2	4.6	4.8	4.8	4.8	5.2	4.0	3.3	4.2	5.3	5.7	5.9	5.8	5.7	5.4	4.7	4.2	4.6	5.0	5.4	5.0	4.8	5.0	4.6	4.9
San Juan, Porto Rico.	6.7	6.7	7.3	6.8	6.1	6.2	6.2	6.4	9.0	11.0	12.2	12.6	13.4	14.1	13.7	13.1	11.9	11.1	10.7	9.9	9.2	8.3	8.1	7.4	9.5
Santiago de Cuba	3.0	2.9	3.5	3.3	3.4	3.5	3.4	4.1	5.6	6.6	6.8	6.1	6.2	6.0	5.8	5.4	4.5	3.2	3.3	3.6	3.9	3.7	3.3	2.8	4.3
Santo Domingo, S. D.	4.4	4.8	5.0	5.2	5.3	5.4	5.4	5.9	6.6	6.6	6.4	6.7	6.5	7.0	6.4	5.9	5.1	5.1	4.4	4.9	5.2	5.1	5.0	4.9	5.5
Willemstad, Curaçao.	7.5	7.4	7.0	6.9	6.8	7.1	7.7	10.2	11.1	11.3	11.6	11.5	11.8	11.6	11.4	11.3	11.3	10.2	9.3	9.4	9.1	8.2	7.8	7.6	9.4

TABLE VI.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of November*, 1900.

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
New England.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Eastport, Me	17	17	13	26	w.	13
Portland, Me	18	15	6	29	n. 83 w.	23
Northfield, Vt	19	34	3	10	s. 25 w.	17
Boston, Mass	18	19	9	25	s. 87 w.	16
Nantucket, Mass	19	20	12	24	s. 85 w.	12
Block Island, R. I	18	16	13	29	n. 83 w.	16
New Haven Conn	31	13	5	22	n. 43 w.	25
Middle Atlantic States.						
Albany, N. Y	22	20	3	21	n. 84 w.	18
Binghamton, N. Y.†	9	7	3	19	n. 83 w.	16
New York, N. Y	20	15	13	29	n. 73 w.	17
Harrisburg, Pa.†	5	6	7	15	s. 83 w.	8
Philadelphia, Pa	22	17	9	26	n. 74 w.	18
Scranton, Pa	22	17	8	28	n. 76 w.	21
Atlantic City, N. J	23	17	6	29	n. 75 w.	24
Cape May, N. J.	21	19	7	23	n 83 w.	16
Baltimore, Md	17	19	10	28	s. 84 w.	18
Washington, D. C	23	21	5	26	n. 85 w.	21
Lynchburg, Va	17	20	13	29	s. 79 w.	16
Norfolk, Va	19	24	13	17	s. 39 w.	6
Richmond, Va	25	22	6	22	n. 79 w.	16
South Atlantic States.						
Charlotte, N. C	21	19	19	16	n. 56 e.	4
Hatteras, N. C	23	18	12	20	n. 58 w.	9
Kittyhawk, N. C*	14	9	10	6	n. 39 e.	6
Raleigh, N. C	23	17	7	24	n. 71 w.	18
Wilmington, N. C	20	18	17	21	n. 63 w.	4
Charleston, S. C	22	15	14	23	n. 52 w.	11
Augusta, Ga	21	16	12	26	n. 70 w.	15
Savannah, Ga	21	16	13	21	n. 58 w.	9
Jacksonville, Fla	27	15	15	16	n. 5 w.	12
Florida Peninsula.						
Jupiter, Fla	20	6	30	14	n. 49 e.	21
Key West, Fla	31	1	37	6	n. 46 e.	43
Tampa, Fla	35	4	14	18	n. 7 w.	31
Eastern Gulf States.						
Atlanta, Ga	23	14	12	28	n. 61 w.	18
Macon, Ga†	14	7	3	11	n. 49 w.	11
Pensacola, Fla.†	18	6	10	2	n. 34 e.	14
Mobile, Ala	33	15	6	14	n. 24 w.	20
Montgomery, Ala	21	13	19	17	n. 14 e.	8
Meridian, Miss.†	14	8	7	10	n. 27 w.	7
Vicksburg, Miss	24	21	22	11	n. 75 e.	11
New Orleans, La	29	15	21	10	n. 38 e.	18
Western Gulf States.						
Shreveport, La	16	25	16	12	s. 24 e.	10
Fort Smith, Ark	18	12	28	14	n. 67 e.	15
Little Rock, Ark	25	19	16	21	n. 40 w.	8
Corpus Christi, Tex	24	22	19	8	n. 80 e.	11
Fort Worth, Tex†	9	11	3	13	s. 79 w.	10
Galveston, Tex	19	20	24	10	s. 86 e.	14
Palestine, Tex	14	30	16	10	s. 21 e.	17
San Antonio, Tex	26	16	25	7	n. 61 e.	21
Ohio Valley and Tennessee.						
Chattanooga, Tenn	15	22	11	27	s. 66 w.	17
Knoxville, Tenn	25	20	8	21	n. 69 w.	14
Memphis, Tenn	12	22	15	14	s. 6 e.	10
Nashville, Tenn	19	21	7	25	s. 84 w.	18
Lexington, Ky†	6	13	5	12	s. 45 w.	10
Louisville, Ky	18	21	6	24	s. 81 w.	18
Evansville, Ind.†	9	13	3	12	s. 66 w.	10
Indianapolis, Ind	22	22	6	22	w.	16
Cincinnati, Ohio	15	22	15	23	s. 49 w.	11
Columbus, Ohio	13	22	8	28	s. 66 w.	22
Pittsburg, Pa	19	20	7	33	s. 88 w.	26
Parkersburg, W. Va	17	27	8	21	s. 52 w.	16
Elkins, W. Va	15	21	5	25	s. 73 w.	21
Lower Lake Region.						
Buffalo, N. Y	13	15	8	33	s. 85 w.	25
Oswego, N. Y	13	27	14	21	s. 16 w.	15
Rochester, N. Y	9	30	9	32	s. 48 w.	31
Erie, Pa	12	26	5	31	s. 62 w.	30
Cleveland, Ohio	8	34	14	21	s. 15 w.	27
Sandusky, Ohio	9	24	6	38	s. 65 w.	35
Toledo, Ohio	10	27	7	30	s. 54 w.	29
Detroit, Mich	10	20	4	40	s. 74 w.	37
Upper Lake Region.						
Alpena, Mich	25	9	11	30	n. 50 w.	25
Escanaba, Mich	19	14	5	35	n. 81 w.	30
Grand Haven, Mich	25	13	13	25	n. 45 w.	17
Houghton, Mich†	14	5	9	11	n. 13 w.	9
Marquette, Mich	21	13	8	35	n. 73 w.	28
Port Huron, Mich	12	23	5	34	s. 69 w.	31
Sault Ste. Marie, Mich	21	13	24	17	n. 41 e.	11
Chicago, Ill	23	14	8	31	n. 69 w.	25
Milwaukee, Wis	21	10	6	37	n. 70 w.	33
Green Bay, Wis	17	17	2	34	w.	32
Duluth, Minn	26	14	5	35	n. 68 w.	32
North Dakota.						
Moorhead, Minn	21	16	14	27	n. 60 w.	14
Bismarck, N. Dak	29	7	16	19	n. 8 w.	22
Williston, N. Dak	24	12	6	24	n. 56 w.	22
Upper Mississippi Valley.						
St. Paul, Minn	20	20	8	29	w.	21
Upper Mississippi Valley.—Con'd.						
La Crosse, Wis.†	12	11	3	10	n. 82 w.	7
Davenport, Iowa	16	12	10	36	n. 81 w.	26
Des Moines, Iowa	28	12	11	21	n. 32 w.	19
Dubuque, Iowa	21	16	9	29	n. 76 w.	21
Keokuk, Iowa	23	14	12	26	n. 57 w.	17
Cairo, Ill	26	24	10	19	n. 77 w.	9
Springfield, Ill	21	17	10	26	n. 76 w.	16
Hannibal, Mo†	10	9	7	11	n. 76 w.	4
St. Louis, Mo	18	23	6	26	s. 76 w.	21
Missouri Valley.						
Columbia, Mo.*	14	9	3	8	n. 45 w.	7
Kansas City, Mo	26	17	10	18	n. 42 w.	12
Springfield, Mo	20	23	9	16	s. 67 w.	8
Lincoln, Nebr	27	19	12	12	n.	8
Omaha, Nebr	24	16	10	22	n. 56 w.	14
Valentine, Nebr	24	11	10	31	n. 59 w.	25
Sioux City, Iowa†	13	9	3	13	n. 68 w.	11
Pierre, S. Dak	18	18	23	16	e.	7
Huron, S. Dak	24	16	13	24	n. 54 w.	14
Yankton, S. Dak†	9	6	3	18	n. 79 w.	15
Northern Slope.						
Havre, Mont	16	11	18	31	n. 69 w.	14
Miles City, Mont	19	19	13	20	w.	7
Helena, Mont	14	22	3	36	s. 76 w.	34
Kalispell, Mont	17	14	3	37	n. 85 w.	34
Rapid City, S. Dak	22	14	13	24	n. 54 w.	14
Cheyenne, Wyo	24	10	5	35	n. 65 w.	33
Lander, Wyo	15	26	12	25	s. 50 w.	17
North Platte, Nebr	15	18	12	26	s. 78 w.	14
Middle Slope.						
Denver, Colo	16	27	15	16	s. 5 w.	11
Pueblo, Colo	20	9	23	22	n. 5 e.	11
Concordia, Kans	22	21	14	17	n. 72 w.	3
Dodge, Kans	25	17	19	13	n. 37 e.	10
Wichita, Kans	28	24	13	6	n. 60 e.	8
Oklahoma, Okla	21	28	13	9	s. 30 e.	8
Southern Slope.						
Abilene, Tex	17	19	11	15	s. 63 w.	4
Amarillo, Tex	14	28	14	17	s 12 w.	14
Southern Plateau.						
El Paso, Tex	18	12	18	29	n. 61 w.	12
Santa Fe, N. Mex	22	20	32	5	n. 86 e.	27
Flagstaff, Ariz	18	9	23	20	n. 18 e.	10
Phoenix, Ariz	13	10	32	17	n. 79 e.	15
Yuma, Ariz	34	6	21	12	n. 18 e.	29
Independence, Cal	19	20	8	30	s. 87 w.	22
Middle Plateau.						
Carson City, Nev	16	21	14	22	s. 58 w.	9
Winnemucca, Nev	15	19	22	14	s. 63 e.	9
Cedar City, Utah	6	34	26	11	s. 28 e.	32
Salt Lake City, Utah	14	23	20	22	s. 13 w.	9
Grand Junction, Colo	19	20	29	14	s. 86 e.	15
Northern Plateau.						
Baker City, Oreg	6	42	11	9	s. 3 e.	36
Boise, Idaho	17	18	20	19	s. 45 e.	1
Lewiston, Idaho†	6	2	18	7	n. 70 e.	12
Pocatello, Idaho	16	26	11	18	s. 35 w.	12
Spokane, Wash	24	15	23	12	n. 51 e.	14
Walla Walla, Wash	7	27	8	17	s. 24 w.	22
North Pacific Coast Region.						
Neah Bay, Wash	1	15	34	16	s. 52 e.	23
Port Crescent, Wash*	0	9	19	8	s. 51 e.	14
Seattle, Wash	21	24	20	8	s. 76 e.	12
Tacoma, Wash	14	27	12	16	s. 17 w.	14
Astoria, Oreg	11	16	33	11	s. 77 e.	23
Portland, Oreg	15	21	17	20	s 27 w.	7
Roseburg, Oreg	17	17	16	22	w.	6
Middle Pacific Coast Region.						
Eureka, Cal	14	25	14	22	s. 36 w.	14
Mount Tamalpais, Cal	17	13	22	20	n. 18 e.	6
Red Bluff, Cal	33	11	16	14	n. 5 e.	22
Sacramento, Cal	23	26	14	11	s. 45 e.	4
San Francisco, Cal	24	10	3	33	n. 64 w.	32
South Pacific Coast Region.						
Fresno, Cal	23	13	11	30	n. 62 w.	22
Los Angeles, Cal	23	7	15	27	n. 37 w.	20
San Diego, Cal	34	8	13	19	n. 13 w.	27
San Luis Obispo, Cal	37	12	1	12	n. 24 w.	27
West Indies.						
Basseterre, St. Kitts Island	24	5	42	2	n. 65 e.	44
Bridgetown, Barbados	5	14	50	1	s. 80 e.	50
Cienfuegos, Cuba	41	1	38	1	n. 43 e.	54
Grand Turk, Turks Island, W. I.	10	7	21	1	n. 81 e.	20
Havana, Cuba	19	4	42	4	n. 69 e.	41
Kingston, Jamaica	48	0	24	1	n. 26 e.	53
Port of Spain, Trinidad	15	12	38	4	n. 85 e.	34
Puerto Principe, Cuba	40	2	39	1	n. 45 e.	54
Roseau, Dominica, W. I	20	7	36	11	n. 63 e.	28
San Juan, Porto Rico	9	21	39	5	s. 71 e.	36
Santiago de Cuba, Cuba	35	10	30	1	n. 49 e.	38
Santo Domingo, S. Domingo, W. I.	52	3	3	2	n. 1 e.	49
Willemstad, Curaçao	9	4	54	0	n. 86 e.	54

* From observations at 8 p. m. only.

† From observations at 8 a. m. only.

TABLE VII.—*Thunderstorms and auroras, November*, 1900.

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total. No.	Total. Days.	
Alabama	52	T.																		1	5	3	2			3								14	5	T.
		A.																																0	0	A.
Arizona	56	T.																	1	4	5	1												11	4	T.
		A.																																0	0	A.
Arkansas	57	T.							1		1									5	6	10	2	4	15	6	2							52	10	T.
		A.																																0	0	A.
California	167	T.							9									5	5		1	1	2											23	6	T.
		A.																																0	0	A.
Colorado	81	T.																				1												1	1	T.
		A.												1				1								1								3	3	A.
Connecticut	21	T.							1	10	7												1				1	1						21	6	T.
		A.																																0	0	A.
Delaware	5	T.																									1							1	1	T.
		A.																																0	0	A.
Dist. of Columbia	4	T.								1																								1	1	T.
		A.																																0	0	A.
Florida	47	T.	2	2	1				1						1					1								1						9	7	T.
		A.																																0	0	A.
Georgia	55	T.																					1			1	2							4	3	T.
		A.																																0	0	A.
Idaho	34	T.																		2			1											3	2	T.
		A.																																0	0	A.
Illinois	92	T.																2	23	25	17	21	6	6	4	1								105	9	T.
		A.																																0	0	A.
Indiana	58	T.																1	6	1		8	7	8	4	1								36	8	T.
		A.																																0	0	A.
Indian Territory	11	T.																		6														6	1	T.
		A.																																0	0	A.
Iowa	149	T.																	2	9	2													13	3	T.
		A.																																0	0	A.
Kansas	77	T.																1		12		7		1	11									32	5	T.
		A.																																0	0	A.
Kentucky	41	T.									1											14	4	10	9	9	1							48	7	T.
		A.																																0	0	A.
Louisiana	46	T.																		1	4	4			1	6	1							17	6	T.
		A.																																0	0	A.
Maine	19	T.							1	7	8					1							1											18	5	T.
		A.																																0	0	A.
Maryland	48	T.							10	4												2			2		6	3						27	6	T.
		A.																					1											1	1	A.
Massachusetts	48	T.							2	25	20						2								2		2							53	6	T.
		A.																																0	0	A.
Michigan	106	T.	1				1												1	4	3	9	14											33	7	T.
		A.																																0	0	A.
Minnesota	67	T.																																0	0	T.
		A.										1																			1			2	2	A.
Mississippi	44	T.																			10	4	1		2	1	1							19	6	T.
		A.																																0	0	A.
Missouri	95	T.							1			1						3	2	23	11	11	1	4	18	6	1		1					83	13	T.
		A.																																0	0	A.
Montana	40	T.																																0	0	T.
		A.																1																1	1	A.
Nebraska	142	T.															1																	1	1	T.
		A.																							1			1	1					3	3	A.
Nevada	40	T.																	1															1	1	T.
		A.				1																												1	1	A.
New Hampshire	19	T.							1	13	11													1	3									29	5	T.
		A.																																0	0	A.
New Jersey	51	T.								10	9																11	2						32	4	T.
		A.																																0	0	A.
New Mexico	31	T.																																0	0	T.
		A.																																0	0	A.
New York	99	T.					4		3	5	6											1	11	25	2			1			1			59	10	T.
		A.																																0	0	A.
North Carolina	56	T.				2			3	9												1	2		1	1	9	3						31	9	T.
		A.																																0	0	A.
North Dakota	48	T.																																0	0	T.
		A.																																0	0	A.
Ohio	128	T.							1											1		1	5	19	8	1								36	7	T.
		A.																																0	0	A.
Oklahoma	23	T.																		4	1	1												6	3	T.
		A.																																0	0	A.
Oregon	74	T.																		1														1	1	T.
		A.																																0	0	A.
Pennsylvania	91	T.							1	1													1	6	6	2	5	4						26	8	T.
		A.																																0	0	A.
Rhode Island	7	T.								2	2																1							5	3	T.
		A.																																0	0	A.
South Carolina	46	T.			1	1																					4							6	3	T.
		A.																																0	0	A.
South Dakota	56	T.																																0	0	T.
		A.																								1								1	1	A.
Tennessee	56	T.																				14	3		8	4	2							31	5	T
		A.																																0	0	A.
Texas	95	T.	1								1									5	3	1			8	3								22	7	T.
		A.																																0	0	A.
Utah	47	T.																	4	1	3			1										9	4	T.
		A.																									1							1	1	A.
Vermont	16	T.								5	5						1							1	1									13	5	T.
		A.																																0	0	A.
Virginia	50	T.							2	7		1													1	4	3	3						21	7	T.
		A.																																0	0	A.
Washington	64	T.																	2															2	1	T.
		A.																																0	0	A.
West Virginia	43	T.					1														1				8	1	2							13	5	T.
		A.								1					1													1						3	3	A.
Wisconsin	60	T.																	1	1														2	2	T.
		A.																																0	0	A.
Wyoming	31	T.																																0	0	T.
		A.																																0	0	A.
Sums	2,893	T.	4	2	2	3	6	0	37	99	71	2	0	0	1	1	4	12	48	107	72	115	65	86	114	50	55	18	1	0	1	0	....	976	....	T.
		A.	0	0	0	1	0	0	0	1	0	1	0	0	2	0	0	1	1	0	0	0	1	0	1	2	2	2	1	0	1	0	....	17	....	A.

TABLE VIII.—*Average hourly sunshine (in percentages), November, 1900.*

Stations.	Instrument.	Percentages for each hour of local mean time ending with the respective hour.																Hours of sunshine.			
		A. M.								P. M.								Total.			Personal estimate.
		5	6	7	8	9	10	11	Noon	1	2	3	4	5	6	7	8	Actual.	Possible.	Percent of possible.	
																		Hours.	Hours		
Albany, N.Y	T.			6	7	16	22	27	30	40	30	29	19	13				68.5	292.3	23	21
Atlanta, Ga	T.			44	43	47	51	58	57	62	64	58	58	44				167.8	312.2	54	49
Atlantic City, N.J	T.			40	31	39	46	53	60	58	50	45	33	30	33			134.7	301.5	45	41
Baltimore, Md	T.			36	27	37	37	46	44	51	55	65	44	40				134.2	301.5	45	40
Binghamton, N.Y	T.			8	10	12	13	17	20	23	18	20	22	26				51.9	294.9	18	16
Bismarck, N. Dak	P.			47	45	55	58	66	70	48	68	64	54	53				164.5	281.0	59	53
Boise, Idaho	P.			72	41	46	48	55	54	52	57	53	50	51				147.7	289.7	51	47
Boston, Mass	T.			30	29	37	36	47	45	51	46	42	40	33				119.6	294.9	41	34
Buffalo, N.Y	T.			16	9	20	31	33	41	44	34	26	23	11				81.1	292.3	28	14
Cedar City, Utah	T.			65	60	62	73	74	78	72	74	61	52	44	100			198.8	304.0	65	53
Charleston, S. C	T.			43	49	58	60	57	55	68	65	58	43	35	25			170.3	314.0	54	58
Chattanooga, Tenn	T.			39	33	39	55	60	66	68	63	62	55	52	50			169.5	310.1	55	52
Cheyenne, Wyo	P.			77	56	56	63	64	61	66	68	67	66	61				187.4	297.3	63	57
Chicago, Ill	T.			42	30	32	38	44	52	50	46	36	34	35				117.7	294.9	40	39
Cincinnati, Ohio	T.			38	33	34	42	48	54	54	52	45	39	36				132.3	301.5	44	44
Cleveland, Ohio	T.			13	14	16	27	29	33	30	33	27	27	31				78.0	294.9	26	20
Columbia, Mo	T.			52	62	69	68	74	75	76	74	69	58	54				204.8	301.5	68	48
Columbus, Ohio*	T.																				
Denver, Colo	P.			76	63	70	75	78	83	76	75	74	78	69				222.8	299.7	74	61
Des Moines, Iowa	T.			49	31	37	40	47	46	42	42	40	31	31				115.4	294.9	39	33
Detroit, Mich	T.			21	17	26	31	34	33	34	32	22	19	19				78.8	294.9	27	23
Dodge, Kans	P.			52	49	60	74	75	74	73	72	72	67	70	0			206.9	304.0	68	58
Dubuque, Iowa	T.			43	35	44	49	54	58	59	49	41	37	40				137.3	294.9	47	41
Eastport, Me	P.			17	11	17	25	29	34	41	42	43	34	32				88.9	287.2	31	24
Elkins, W. Va	T.			4	3	11	21	30	34	44	47	47	25	16				82.9	301.5	27	28
Erie, Pa	T.			28	10	8	14	16	16	22	21	21	11	13				45.9	294.9	16	21
Escanaba, Mich	T.			35	22	18	13	20	21	26	22	16	8	4				50.5	284.1	18	17
Eureka, Cal	P.			17	18	30	39	39	42	43	37	36	21	15				95.7	297.3	32	35
Fresno, Cal	T.			30	20	27	41	48	50	53	50	44	37	29	100			121.7	305.7	40	37
Galveston, Tex.*	P.																				
Grand Junction, Colo	P.			79	63	62	64	67	64	64	71	74	67	65				200.7	301.5	67	57
Harrisburg, Pa	T.			15	11	18	31	36	39	48	41	43	35	39				100.3	299.7	33	33
Helena, Mont	P.			35	26	37	47	49	60	61	68	57	42	36				138.8	281.0	49	42
Huron, S. Dak	T.			64	49	43	51	57	58	59	59	53	48	52				154.2	289.7	53	45
Indianapolis, Ind	T.			36	27	29	38	44	50	55	46	38	30	31				116.8	299.7	39	30
Jacksonville, Fla	T.			74	69	70	79	85	88	85	79	77	71	59	48			242.4	319.7	76	58
Jupiter, Fla	T.			37	55	70	82	89	83	78	77	71	56	27	27			215.1	325.0	66	51
Kalispell, Mont	T.			2	18	26	27	28	39	40	39	29	16	14				79.0	278.0	28	29
Kansas City, Mo	P.			68	56	54	56	62	58	58	54	54	58	69				174.9	301.5	58	55
Knoxville, Tenn	T.			29	31	43	55	54	58	55	59	53	44	47	15			151.6	308.3	49	44
Lexington, Ky	T.			35	35	47	55	65	63	58	62	60	50	45	100			162.9	304.0	54	50
Little Rock, Ark	T.			46	42	59	64	61	62	62	61	66	61	64	75			184.6	310.1	60	50
Los Angeles, Cal	P.			61	64	71	77	78	79	81	84	83	81	76	100			239.2	312.2	77	63
Louisville, Ky	T.			59	55	58	59	62	58	59	61	59	46	49	100			172.7	304.0	57	53
Macon, Ga	T.			39	37	45	51	62	66	72	73	66	62	50	38			181.1	314.0	58	51
Meridian, Miss	T.			56	53	52	59	63	65	60	63	65	54	50	67			184.7	315.9	58	55
Mount Tamalpais, Cal	P.			64	46	46	52	51	50	49	48	59	59	49	100			155.9	304.0	51	52
Nashville, Tenn	T.			47	41	59	65	67	74	75	72	72	60	58	100			197.5	308.3	64	59
New Haven, Conn	T.			28	23	36	40	47	52	57	53	50	36	18				123.9	297.3	42	40
New Orleans, La	T.			31	31	54	68	73	68	75	71	63	60	40	36			187.1	319.7	59	56
New York, N. Y	T.			33	25	28	38	52	54	57	56	49	38	33				128.4	297.3	43	33
Norfolk, Va	T.			46	49	59	61	68	76	78	76	64	55	45	0			191.9	305.7	63	54
Northfield, Vt	P.			17	23	23	34	33	39	40	37	32	21	18				88.4	289.7	31	19
Oklahoma, Okla	T.			39	35	56	68	70	73	76	73	69	56	57	100			193.5	310.1	62	61
Omaha, Nebr	T.			45	40	45	47	53	58	57	60	59	53	56				156.1	297.3	53	46
Parkersburg, W. Va	T.			6	5	10	18	34	36	33	37	30	20	14				70.7	301.5	23	21
Philadelphia, Pa	T.			33	30	38	45	63	72	66	56	52	49	46				153.7	299.7	51	33
Phoenix, Ariz	P.			76	76	77	81	87	85	80	79	75	74	71	94			245.8	314.0	78	73
Pittsburg, Pa	T.			32	17	18	18	39	40	43	47	38	22	25				92.4	297.3	31	34
Pocatello, Idaho	T.			58	34	41	49	57	64	61	57	46	42	45				146.4	292.3	50	38
Portland, Me	T.			14	21	35	42	51	55	56	58	58	26	22				124.8	289.7	43	33
Portland, Oreg	T.			17	22	20	25	34	37	48	48	36	20	24				90.3	284.1	32	36
Pueblo, Colo	T.			63	58	74	88	92	94	93	92	94	83	74				254.9	304.0	84	65
Raleigh, N.C	T.			45	47	49	64	70	63	58	57	52	45	43	5			168.3	308.3	55	54
Rochester, N. Y	T.			26	11	15	20	24	24	22	21	24	16	4				55.1	292.3	19	16
St. Louis, Mo	T.			47	41	51	60	69	72	73	65	62	45	46				175.9	301.5	58	52
St. Paul, Minn	P.			28	22	28	30	37	43	43	43	47	45	42				108.9	287.2	38	41
Salt Lake City, Utah	T.			65	50	51	62	66	65	64	67	52	53	50				177.8	297.3	60	59
San Diego, Cal	P.			49	47	71	77	78	82	80	83	82	70	60	100			226.3	314 0	72	78
San Francisco, Cal	P.			33	34	46	62	79	88	84	88	85	66	41	0			202.9	304.0	67	46
Santa Fe, N. Mex	P.			77	73	73	75	77	76	80	84	79	73	70	100			234.8	308.3	76	72
Sault Ste. Marie, Mich	T.			0	2	13	26	34	39	35	30	22	9	2				63.3	284.1	22	13
Savannah, Ga	T.			44	44	54	67	78	72	64	60	48	40	30	17			173.8	315.9	55	53
Seattle, Wash.*	T.																				
Spokane, Wash	T.			20	8	4	2	9	18	14	10	10	8	15				26.6	278.0	10	11
Tacoma, Wash	T.			0	0	1	6	29	28	32	30	26	13	5				49.8	281.0	18	21
Tampa, Fla	T.			67	65	72	79	85	75	84	80	84	64	57	51			238.4	323.5	74	61
Toledo, Ohio	T.			30	20	21	30	36	38	39	32	25	22	19				84.0	294.9	28	31
Topeka, Kans	T.			58	48	46	52	55	59	58	57	56	54	57				163.5	301.5	54	48
Vicksburg, Miss	T.			54	50	57	66	70	72	72	74	69	63	54	50			203.0	315.9	64	58
Washington, D.C	P.			37	33	47	44	50	43	47	49	54	53	52				141.4	301.5	47	50
Wilmington, N.C	T.			54	61	79	84	87	89	88	90	88	75	51	17			244.2	312.2	78	61
Yankton, S. Dak	T.			21	25	44	53	58	62	66	70	58	51	26				151.6	292.3	52	50
Basseterre, St. Kitts	T.		20	46	62	81	90	91	92	94	91	90	84	65	46			270.9	340.5	80	63
Bridgetown, Barbados	T.		44	53	75	95	92	94	97	92	87	81	56	50	44			268.3	346.1	78	46
Cienfuegos, Cuba	T.			71	73	72	76	80	73	70	63	54	43	36	31			212.1	332.8	64	60
Havana, Cuba	T.			42	55	70	76	75	77	71	70	62	55	41	37			208.0	331.2	63	45
Kingston, Jamaica, W. I	T.		0	46	62	66	80	88	84	86	73	74	56	37	36			228.4	338.8	67	50
Port of Spain, Trinidad, W. I	T.		16	23	50	72	67	66	62	55	44	44	31	17	1			160.0	349.1	46	33
Puerto Principe, Cuba	T.			26	42	56	56	49	54	50	43	41	26	25	22			140.8	334.5	42	38
Roseau, Dominica, W. I	T.		80	34	36	56	81	90	89	85	85	80	66	49	44			231.8	343.7	67	54
San Juan, Porto Rico	T.		0	38	67	86	94	92	91	91	94	88	72	39	25			257.6	338.8	76	73
Santiago de Cuba, Cuba	T.			79	76	79	79	85	83	81	79	65	48	52	47			243.2	335.9	72	54
Santo Domingo, Santo Domingo	T.		0	80	81	88	95	86	76	74	75	65	48	26	26			238.5	338.8	70	65
Willemstad, Curaçao	T.		7	10	31	42	58	58	56	72	68	68	59	35	30			172.4	347.6	50	42

*Record incomplete.

TABLE IX.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour during November, 1900, at all stations furnished with self-registering gages.*

Stations.	Date.	Total duration. From—	Total duration. To—	Total am't of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Albany, N. Y.	9			1.60														0.23			
Alpena, Mich.	20-21			0.78														*			
Atlanta, Ga.	25	8.12 a.m.	12.55 a.m.	1.64	8.35 a.m.	9.35 a.m.	0.10	0.09	0.22	0.28	0.38	0.44	0.49	0.60	0.80	0.92	1.01	1.16			
Atlantic City, N. J.	25-26			1.10														0.85			
Baltimore, Md.	25-26			0.47														0.20			
Binghamton, N. Y.	24-26			1.93														0.32			
Bismarck, N. Dak.	19-20			0.52														*			
Boise, Idaho	18			0.13														0.12			
Boston, Mass.	25-26			2.63														0.26			
Buffalo, N. Y.	11-12			0.67														0.21			
Cairo, Ill.	20			1.05														0.74			
Cedar City, Utah	26			0.16														*			
Charleston, S. C.	3	6.10 a.m.	12.38 p.m.	3.45	8.55 a.m.	9.43 a.m.	0.24	0.08	0.21	0.34	0.56	0.71	0.93	1.24	1.52	1.92	2.01	2.02			
Chicago, Ill.	18-19			1.56														*			
Cincinnati, Ohio	20			1.52														*			
Cleveland, Ohio	24-25			1.07														0.13			
Columbia, Mo.	23			0.33														0.12			
Columbus, Ohio	24-25			1.28														0.33			
Denver, Colo.	27			0.36														*			
Des Moines, Iowa	18			0.24														0.09			
Detroit, Mich.	18-19			1.65														0.21			
Dodge, Kans	27			0.05														0.04			
Duluth, Minn.	19-20			0.12														*			
Eastport, Me.	26-27			0.95														0.16			
Elkins, W. Va	25-26			3.15														0.39			
Erie, Pa.	24-26			2.54														*			
Escanaba, Mich.	1			0.85														0.22			
Evansville, Ind	20	D. N.	7.55 a.m.	1.66	5.00 a.m.	5.25 a.m.	0.56	0.11	0.28	0.44	0.52	0.59	0.63	0.66							
Fort Worth, Tex.	20			0.40														0.28			
Fresno, Cal.	16-17			3.18														*			
Galveston, Tex.	29			1.26														*			
Grand Junction, Colo.	19-20			0.21														*			
Harrisburg, Pa	24-26			1.87														0.36			
Hatteras, N. C.	3-4			2.02														0.36			
Huron, S. Dak.	15-16			0.04														*			
Indianapolis, Ind.	19			0.79														0.32			
Jacksonville, Fla.	17			0.77														0.28			
Jupiter, Fla.	12			0.48								0.47									
Kalispell, Mont	17-18			0.66														*			
Kansas City, Mo.	23-24			0.61														*			
Key West, Fla.	4			0.20						0.20											
Knoxville, Tenn	24-25			3.57														0.37			
Lexington, Ky.	20-21			3.12														0.80			
Lincoln, Nebr.	2			0.01																	
Little Rock, Ark.	23-24	7.40 p.m.	10.55 a.m.	2.43	9.15 p.m.	10.55 p.m.	0.08	0.12	0.24	0.34	0.43	0.45	0.46	0.48	0.52	0.62	0.75	0.87	0.97	1.42	1.60
Los Angeles, Cal.	20-22			3.84														0.60			
Louisville, Ky.	20			2.33														0.76			
Macon, Ga.	1-2	12.41 p.m.	6.12 a.m.	2.25	1.35 p.m.	3.35 p.m.	0.16	0.05	0.10	0.17	0.23	0.30	0.35	0.42	0.48	0.54	0.61	0.76	0.95	1.22	1.49
Do	25	10.15 a.m.	2.13 p.m.	1.02	12.45 p.m.	12.57 p.m.	0.24	0.05	0.53	0.66											
Memphis, Tenn.	19-20			2.84														0.90			
Meridian, Miss.	19-20	6.31 p.m.	D. N.	1.48	7.20 p.m.	8.00 p.m.	T.	0.05	0.11	0.20	0.31	0.51	0.75	1.10	1.22	1.24					
Milwaukee, Wis.	17-19			1.40														*			
Montgomery, Ala	1	11.03 a.m.	1.38 p.m.	2.33	11.45 a.m.	1.05 p.m.	0.33	0.14	0.46	0.78	0.87	0.96	1.08	1.20	1.25	1.38	1.48	1.53	1.95		
Nantucket, Mass.	8-9			1.24														0.60			
Nashville, Tenn.	20-21	5.25 a.m.	3.00 a.m.	6.05	12.18 a.m.	12.32 a.m.	2.90	0.44	0.89	1.26	1.28	1.32									
					1.00 a.m.	2.30 a.m.	4.30	0.06	0.16	0.35	0.44	0.53	0.59	0.72	0.82	0.92	0.95	1.10	1.60	1.75	
New Haven, Conn.	25-26			1.76														0.24			
New Orleans, La.	24-25			0.54										0.37							
New York, N. Y.	25-26			2.19														0.53			
Norfolk, Va.	2-4			2.24														0.31			
Northfield, Vt.	24-25			1.36														*			
Oklahoma, Okla.	18			1.40														0.66			
Omaha, Nebr.	24			0.07														0.02			
Parkersburg, W. Va.	20			2.31														0.76			
Philadelphia, Pa.	25-26			1.70														0.74			
Pittsburg, Pa.	25-26			2.13														*			
Pocatello, Idaho	21			0.48														*			
Portland, Me.	8	9.00 a.m.	10.20 a.m.	1.40	9.05 a.m.	10.00 a.m.	0.02	0.17	0.32	0.46	0.60	0.69	0.83	1.00	1.12	1.20	1.24	1.32			
Portland, Oreg.	24-25			1.89														0.28			
Pueblo, Colo.	27			0.07														*			
Raleigh, N. C.	2-4			2.76														0.35			
Richmond, Va.	26			0.50														0.43			
Rochester, N. Y.	25-27			1.49														0.17			
St. Louis, Mo.	18-19			1.66														0.52			
St. Paul, Minn.	20-21			0.34														0.13			
Salt Lake City, Utah.	16-17			0.58														0.24			
San Diego, Cal.	22			0.52														0.20			
Sandusky, Ohio	24-25			0.79														0.08			
San Francisco, Cal.	16			0.92														0.36			
Savannah, Ga.	3	D. N.	7.10 a.m.	2.40	2.40 a.m.	3.30 a.m.	0.27	0.09	0.12	0.19	0.45	0.61	0.84	1.02	1.08	1.17	1.29	1.34	1.55		
Seattle, Wash.	24-25			1.18														*			
Spokane, Wash.	1-2			0.62														*			
Tampa, Fla.	18			0.26							0.26										
Toledo, Ohio	20			0.23														0.17			
Topeka, Kans.	23-24			0.39														*			
Vicksburg, Miss.	19			0.96														0.59			
Washington, D. C.	3			0.75														0.12			
Wilmington, N. C.	3-4			1.70														0.55			
Yankton, S. Dak	20-21			0.19														*			
Basseterre, St. Kitts.	19	11.22 a.m.	2.00 p.m.	0.95	11.40 a.m.	11.59 a.m.	0.01	0.23	0.48	0.64	0.70										
Bridgetown, Barbados	25	1.22 p.m.	5.55 p.m.	2.34	1.45 p.m.	2.30 p.m.	0.01	0.06	0.26	0.49	0.65	0.71	0.85	1.06	1.19	1.33	1.36	1.37			
					4.00 p.m.	4.45 p.m.	1.45	0.03	0.12	0.30	0.41	0.43	0.49	0.54	0.67	0.73	0.76	0.82			
Cienfuegos, Cuba	3			0.06														0.06			
Havana, Cuba	4			0.25							0.25										
Kingston, Jamaica	20			0.60														0.28			
Port of Spain, Trin.	30	1.43 p.m.	2.46 p.m.	0.95	1.48 p.m.	2.30 p.m.	T.	0.21	0.37	0.40	0.44	0.65	0.81	0.86	0.91	0.95					
Puerto Principe, Cuba	8			0.23							0.23										
Roseau, Dominica	23	6.52 p.m.	D. N.	1.03	7.00 p.m.	7.30 p.m.	T.	0.13	0.35	0.55	0.70	0.85	0.94	0.96							
San Juan, Porto Rico.	18-19	3.53 p.m.	5.00 a.m.	1.58	5.06 p.m.	5.25 p.m.	0.08	0.27	0.54	0.84	1.08	1.09									
Santiago de Cuba	10	3.25 p.m.	6.07 p.m.	0.73	3.50 p.m.	4.15 p.m.	T.	0.09	0.39	0.58	0.65	0.68									
Santo Domingo, S. D.	17			0.83									0.48								
Willemstad, Curaçao	22	9.28 a.m.	1.15 p.m.	2.83	10.22 a.m.	11.35 a.m.	0.25	0.18	0.50	0.69	0.90	1.03	1.17	1.47	1.72	1.91	2.05	2.23	2.44		

*Self register not working.

TABLE X.—*Data furnished by the Canadian Meteorological Service, November, 1900.*

Stations.	Pressure.			Temperature.				Precipitation.		
	Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Mean maximum.	Mean minimum.	Total.	Departure from normal.	Depth of snow.
	Ins.	*Ins.*	*Ins.*	°	°	°	°	*Ins.*	*Ins.*	*Ins.*
St. Johns, N. F	29.75	29.90	—.03	38.3	+ 1.8	44.8	31.8	5.62	+0.08	4.0
Sydney, C. B. I	29.94	29.98	+.02	40.3	+ 3.2	47.6	33.0	8.27	+2.66	8.7
Halifax, N. S	29.89	30.00	.00	41.5	+ 4.2	48.6	34.5	6.87	+1.65	4.9
Grand Manan, N. B	29.94	29.99	—.04	40.1	+ 1.2	47.3	32.9	6.80	+2.57	6.0
Yarmouth, N. S	29.92	30.00	—.04	42.6	+ 2.7	49.2	35.9	4.89	+1.95	2.6
Charlottet'n, P. E. I	29.93	29.97	—.05	38.5	+ 3.0	44.5	32.4	6.80	+3.07	14.1
Chatham, N. B	29.94	29.96	—.02	33.2	+ 2.2	40.8	25.6	3.23	—0.19	11.5
Father Point, Que	29.91	29 94	—.02	28.8	— 0.1	36.5	21.2	2.97	+0.51	10.7
Quebec, Que	29.63	29.97	—.04	30.4	+ 1.4	35.9	24.9	4.80	+0.78	13.2
Montreal, Que	29.77	29.99	—.03	33.0	+ 1.2	38.3	27.7	7.65	+4.48	34 8
Bissett, Ont	29.39	30.02	+.02	27.9	— 0.7	36.0	19.8	2.31	—0.34	7.3
Ottawa, Ont	29.62	29.95	......	33.3	+ 1.6	39.4	27.2	3.50	......	11.0
Kingston, Ont	29.67	29.99	—.05	36.7	+ 1.7	43.2	30.2	3.70	+0.28	10.8
Toronto, Ont	29.62	30.01	—.04	38.6	+ 3.0	44.8	32.5	3.90	+0.95	8.7
White River, Ont	28.65	30.07	+.03	20 9	+ 0.4	28.5	13.4	2 14	+0.25	12.4
Port Stanley, Ont	29.37	30.02	—.03	39.4	+ 2.6	46.1	32.7	4.45	+1.30	8.8
Saugeen, Ont	29.28	30.02	.00	38.3	+ 3.3	44.6	32.0	6.19	+2.29	18.5
Parry Sound, Ont	29.27	29.99	—.03	34.2	+ 2.1	41.3	27.1	7.07	+2.86	19.8
Port Arthur, Ont	29.33	30.06	+.05	25.1	+ 1.1	33.8	16.4	0.67	—1.31	1.8
Winnipeg, Man	29.28	30.17	+.10	16 0	— 2.0	24.9	7.0	0.84	—0.15	7.6
Minnedosa, Man	28.24	30.15	+.11	16.2	— 1.1	25.3	7.0	1.31	+0.51	12.7
Qu'Appelle, Assin	27.75	30.14	+.11	14 7	— 4.1	22.4	6.9	1.97	+1.37	19.4
Medicine Hat, Assin	27.74	30.13	+.09	23.6	— 3.8	34 6	12.5	1.95	+1.62	19.5
Swift Current, Assin	27.46	30.16	+.10	19.8	— 3.4	27.9	11.7	0.46	—0 05	4.6
Calgary, Alberta	26.40	30.09	+.05	20.6	— 5.2	32.2	9.1	1.80	+1.45	18.0
Banff, Alberta	25.32	30.13	......	21 7	......	28.6	14.8	1.25	—2.15	12.4
Edmonton, Alberta	27.66	30.06	+.04	21.7	— 1.2	29.9	13.6	0.18	—0.04	1.8
Prince Albert, Sask	28.48	30.12	......	13.0	— 2.4	21.2	4.8	0.59	—0.23	4.7
Battleford, Sask	28.32	30.16	......	15.2	+ 1.5	23.3	7.0	0.23	—0.37	1.9
Kamloops, B. C	28.82	30.14	......	31.5	— 1.9	38.3	24.7	0.51	—0.59	2.8
Victoria, B. C	29.90	30.00	......	43.5	......	48.6	38.5	2.32	......	0.9
Barkerville, N. W. T.	25.56	30.02	......	22.8	— 0.8	29.5	16.1	3.14	—0.46	30.0
Hamilton, Bermuda	29.96	30.12	+.07	69.4	+ 0.7	73.9	64.8	3.97	—0.23	

TABLE XI.—*Heights of rivers referred to zeros of gages, November, 1900.*

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn	1,954	14	4.6	5-7	1.3	25	3.2	3.3
Reeds Landing, Minn	1,884	12	6.4	6	1.9	30	3.9	4.5
La Crosse, Wis	1,819	12	8.8	4,5	3.5	30	6.4	5.3
Prairie du Chien, Wis	1,759	18	11.2	12	4.6	30	8.3	6.6
Dubuque, Iowa	1,699	15	11.3	13	4.6	30	8.5	6.7
Leclaire, Iowa	1,609	10	7.1	15,16	3.3	30	5.6	3.8
Davenport, Iowa	1,593	15	8.8	15	4.1	30	6.8	4.7
Muscatine, Iowa	1,562	16	10.2	16	5.6	30	8.2	4.6
Galland, Iowa	1,472	8	5.2	19	2.6	30	4.2	2.6
Keokuk, Iowa	1,463	15	8.6	19	4.5	30	7.2	4.1
Hannibal, Mo	1,402	13	9.8	20	5.9	30	8.5	3.9
Grafton, Ill	1,306	23	10.9	1,21,22	8.3	30	9.7	2.6
St. Louis, Mo	1,264	30	13.9	8	10.9	30	12.3	3.0
Chester, Ill	1,189	36	10.1	9	8.5	4,17,18	9.1	1.6
Memphis, Tenn	843	33	19.1	30	5.6	1	8.0	13.5
Helena, Ark	767	42	24.6	30	9.4	1	12.1	15.2
Arkansas City, Ark	635	42	24.5	30	9.8	1	13.7	14.7
Greenville, Miss	595	42	20.2	30	7.8	1	10.9	12.4
Vicksburg, Miss	474	45	18.0	30	6.7	1	10.0	11.3
New Orleans, La	108	16	4.7	10-12	3.6	5	4.3	1.1
Missouri River.								
Bismarck, N. Dak	1,309	14	3.3	16	1.3	4-8, 22, 23	1.8	2.0
Pierre, S. Dak.*	1,114	14	2.2	3	1.5	20	1.8	0.7
Sioux City, Iowa*	784	19	5.5	19	4.2	20	4.9	1.3
Omaha, Nebr	669	18	6.4	1,2	3.6	29	5.4	2.8
St. Joseph, Mo	481	10	3.1	2	− 0.7	30	1.2	3.8
Kansas City, Mo	388	21	10.5	4	5.4	30	7.8	5.1
Boonville, Mo	199	20	9.8	5	5.4	30	7.3	4.4
Hermann, Mo	103	24	9.7	6,7	5.6	18-21	7.2	4.1
Illinois River.								
Peoria, Ill	135	14	9.5	29,30	6.7	1,4-7,10	7.4	2.8
Youghiogheny River.								
Confluence, Pa	59	10	10.3	26	0.1	6-8	1.7	10.2
West Newton, Pa	15	23	14.7	26	0.0	2	1.8	14.7
Allegheny River.								
Warren, Pa	177	14	9.5	26	0.5	1	2.6	9.0
Oil City, Pa	123	13	10.0	27	0.3	1	2.6	9.7
Parker, Pa	73	20	12.6	27	0.7	1,2	2.8	11.9
Monongahela River.								
Weston, W. Va	161	18	12.3	26	− 0.6	18-20	0.7	12.9
Fairmont, W. Va	119	25	23.9	26	0.6	4-7, 18-20	2.7	23.3
Greensboro, Pa	81	18	27.4	26	6.3	5-7	8.5	21.1
Lock No. 4, Pa	40	28	33.8	27	7.4	5,6	10.4	26.4
Conemaugh River.								
Johnstown, Pa	64	7	10.0	26	0.7	3-5,7	1.9	9.3
Red Bank Creek.								
Brookville, Pa	35	8	6.2	26	0.2	1-8, 11-14, 16, 17	1.0	6.0
Beaver River.								
Ellwood Junction, Pa	10	14	4.3	27	0.3	1-18	1.1	4.0
Great Kanawha River.								
Charleston, W. Va	61	30	31.0	27	6.7	3,4,17-20	8.5	24.3
Little Kanawha River.								
Glenville, W. Va	100	24	14.8	26	− 2.0	2,3,16-19	0.2	16.8
New River.								
Hinton, W. Va	95	14	11.5	27	1.5	19,20	2.5	10.0
Cheat River.								
Rowlesburg, W. Va	36	14	11.0	26	1.0	2-7	2.5	10.0
Ohio River.								
Pittsburg, Pa	966	22	27.7	27	5.1	1	8.1	22.6
Davis Island Dam, Pa	960	25	25.6	27	2.2	2,3	5.8	23.4
Wheeling, W. Va	875	36	34.3	28	1.6	4,5	6.4	32.7
Parkersburg, W. Va	785	36	30.0	29	2.3	6,7	6.6	27.7
Point Pleasant, W. Va	703	39	34.6	29	2.2	17-19	7.4	32.4
Huntington, W. Va	660	50	37.7	29	4.5	14	10.2	33.2
Catlettsburg, Ky	651	50	38.7	29	2.5	2,5,6	8.9	36.2
Portsmouth, Ohio	612	50	38.9	30	3.2	1	9.6	35.7
Cincinnati, Ohio	499	50	39.0	30	4.7	17	10.3	34.3
Madison, Ind	413	46	33.5	30	4.6	9,18-20	9.5	28.9
Louisville, Ky	367	28	14.4	30	2.8	19	5.1	11.6
Evansville, Ind	184	35	28.3	30	2.0	1	7.5	26.3
Paducah, Ky	47	40	24.7	30	2.1	18,19	7.3	22.6
Cairo, Ill	1,073	45	28.7	30	11.5	18-20	15.5	17.2
Muskingum River.								
Zanesville, Ohio	70	20	12.0	27,28	6.4	8,9	7.5	5.6
Scioto River.								
Columbus, Ohio	110	17	4.0	27	2.0	1-19, 22-25	2.3	2.0
Miami River.								
Dayton, Ohio	69	18	3.6	26	0.8	11,12,16-18	1.4	2.8
Wabash River.								
Mount Carmel, Ill	50	15	9.7	28,29	1.2	1	4.0	8.5
Licking River.								
Falmouth, Ky	30	25	15.8	26	0.3	1-10,19	3.9	15.5
Clinch River.								
Speers Ferry, Va	156	20	11.8	26	− 0.7	1,19	0.7	12.5
Clinton, Tenn	46	25	23.3	28	2.8	20	6.5	20.5
Tennessee River.								
Knoxville, Tenn	614	20	9.6	27	0.7	20	2.2	8.9
Kingston, Tenn	534	25	11.8	28	1.2	20,21	3.1	10.6
Chattanooga, Tenn	430	33	15.6	28,29	1.9	19,20	4.5	13.7
Bridgeport, Ala	390	24	12.1	29	0.7	19-21	2.7	11.4
Florence, Ala	220	16	10.3	30	0.6	19	2.8	9.7
Tennessee River—Cont'd.								
Riverton, Ala	190	25	14.0	30	0.0	19	2.3	14.0
Johnsonville, Tenn	94	21	13.5	30	1.8	20	5.0	11.7
Cumberland River.								
Burnside, Ky	434	50	46.1	26	0.0	1-3	8.9	46.1
Carthage, Tenn	257	40	31.8	29	0.3	16	7.9	31.5
Nashville, Tenn	175	40	33.1	30	0.9	17,18	9.5	32.2
Arkansas River.								
Wichita, Kans	726	10	2.6	1	1.7	28-30	1.9	0.9
Webbers Falls, Ind. T	413	23	11.3	7	3.2	18	6.3	8.1
Fort Smith, Ark	351	22	11.7	7	3.9	18	8.0	7.8
Dardanelle, Ark	256	21	13.0	3	3.6	18	8.8	9.4
Little Rock, Ark	176	23	13.0	25,26	4.3	1	9.7	8.7
White River.								
Newport, Ark	150	26	21.3	27	1.9	18,19	8.7	19.4
Yazoo River.								
Yazoo City, Miss	80	25	9.6	1-3	1.4	22	6.5	8.2
Red River.								
Arthur City, Tex. §	688	27	......	......	......	......	......	......
Fulton, Ark.†	565	28	23.0	4	7.0	20	14.3	16.0
Shreveport, La	449	29	13.8	7	4.1	1	9.0	9.7
Alexandria, La	139	33	10.7	10,1	0.4	2	5.9	10.3
Ouachita River.								
Camden, Ark	340	39	25.9	29	4.8	21	12.4	21.1
Monroe, La	100	40	12.0	30	2.6	23	6.1	9.4
Atchafalaya River.								
Melville, La	100	31	15.6	30	9.3	1	12.8	6.3
Susquehanna River.								
Wilkesbarre, Pa	178	14	23.6	28	− 2.2	4-8	1.8	25.8
Harrisburg, Pa	70	17	13.3	28	0.5	12	2.0	12.8
W. Br. of Susquehanna.								
Williamsport, Pa	35	20	17.0	27	0.7	18-20	2.4	16.3
Juniata River.								
Huntingdon, Pa	80	24	8.5	26	2.9	1-25	3.3	5.6
Potomac River.								
Harpers Ferry, W. Va	170	16	5.5	28	0.3	1-11, 19-26	0.8	5.2
James River.								
Lynchburg, Va	257	18	15.4	27	0.1	24,25	1.8	15.3
Richmond, Va	110	12	11.2	28	− 1.2	16,17	0.0	12.4
Roanoke River.								
Weldon, N. C	90	40	13.4	29	7.8	18-22	8.5	5.6
Cape Fear River.								
Fayetteville, N. C	100	38	12.5	5	0.5	2	2.8	12.0
Pedee River.								
Cheraw, S. C	145	27	16.4	28	0.9	15	2.7	15.5
Black River.								
Kingstree, S. C	60	12	2.1	7-9	0.5	1-4	1.2	1.6
Lynch Creek.								
Effingham, S. C	35	12	7.4	12	2.9	4,5	4.1	4.5
Santee River.								
St. Stephens, S. C	50	12	7.4	10-12	1.9	22	4.2	5.5
Congaree River.								
Columbia, S. C	37	15	4.0	5	− 0.1	16	0.6	4.1
Wateree River.								
Camden, S. C	45	24	23.5	5	2.9	19	6.5	20.6
Waccamaw River.								
Conway, S. C	40	7	2.9	7,8	0.4	21,22	1.7	2.5
Savannah River.								
Calhoun Falls, S. C	347	......	4.3	4	2.6	16-19,24,25	3.1	1.7
Augusta, Ga	268	32	14.2	27	6.5	19	8.3	7.7
Broad River.								
Carlton, Ga	30	......	6.5	3	2.3	13-18,25	2.7	4.2
Flint River.								
Albany, Ga	80	20	5.6	3	0.9	18-20	2.6	4.7
Chattahoochee River.								
Westpoint, Ga	239	20	5.0	29	2.6	21	3.3	2.4
Ocmulgee River.								
Macon, Ga	125	20	12.3	4	2.0	20	3.4	10.3
Oconee River.								
Dublin, Ga	60	30	6.6	7	0.7	18,20,21,25	2.3	5.9
Coosa River.								
Rome, Ga	225	30	11.5	27	1.4	18,19	3.0	10.1
Gadsden, Ala	144	18	12.4	28	0.5	13-19	2.7	11.9
Alabama River.								
Montgomery, Ala	265	35	13.4	27-29	1.7	21	6.0	11.7
Selma, Ala. ‡	212	35	17.0	30	1.0	15-21	5.4	16.0
Tombigbee River.								
Columbus, Miss	303	33	5.5	3	− 1.6	18-21	1.1	7.1
Demopolis, Ala	155	35	16.6	30	1.2	19	6.8	15.4
Black Warrior River.								
Tuscaloosa, Ala	129	43	22.2	27	1.9	19	7.0	20.3
Brazos River.								
Kopperl, Tex	369	21	3.0	5	1.0	12	1.6	2.0
Waco, Tex	301	22	4.8	1,2	1.0	19-25	1.9	3.8
Columbia River.								
Umatilla, Oreg	270	25	5.5	1,4,5	3.4	27	4.6	2.1
The Dalles, Oreg	166	40	8.0	2,3	4.9	28	6.5	3.1
Willamette River.								
Albany, Oreg	99	20	10.0	1	2.5	17	4.9	7.5
Portland, Oreg	10	15	9.5	3,4	3.2	16	5.6	6.3
Sacramento River.								
Red Bluff, Cal	241	23	7.3	22	0.4	9-13	2.4	6.9
Sacramento, Cal	70	29	19.5	22	8.8	15,16	12.0	10.7

* Record for twenty days. † Record for twenty-seven days. ‡ Record for twenty-six days. § Gage broken.

Baskerville

Chart I. Tracks of Centers of High Areas. November, 1909

Chart I. Tracks of Centers of High Areas. November, 1900.

Chart II. Tracks of Centers of Low Areas. November, 1900.

Chart III. Total Precipitation. November, 1900.

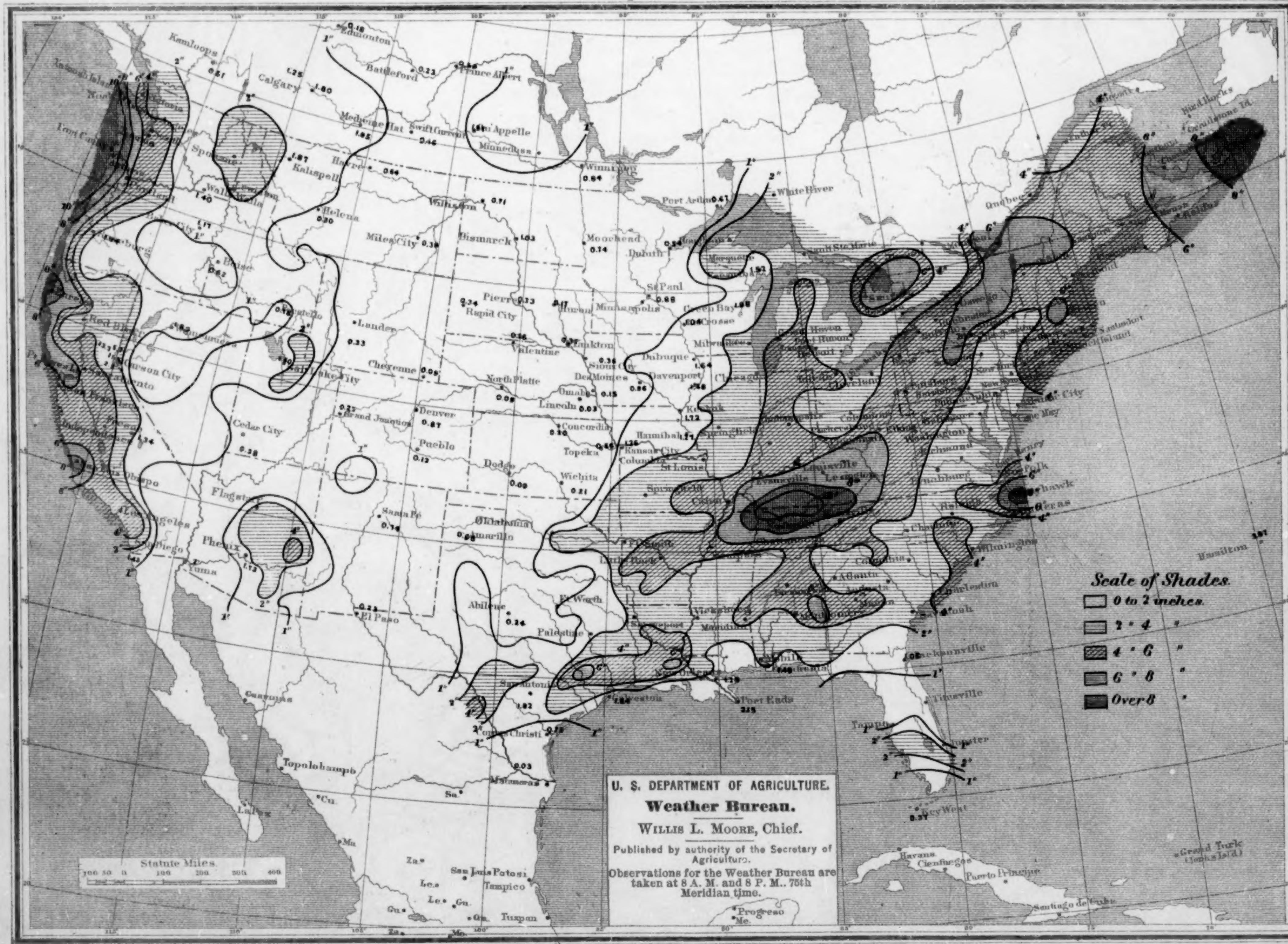

Chart IV. Sea-Level Pressure and Temperature; Resultant Surface Winds. November, 1900.

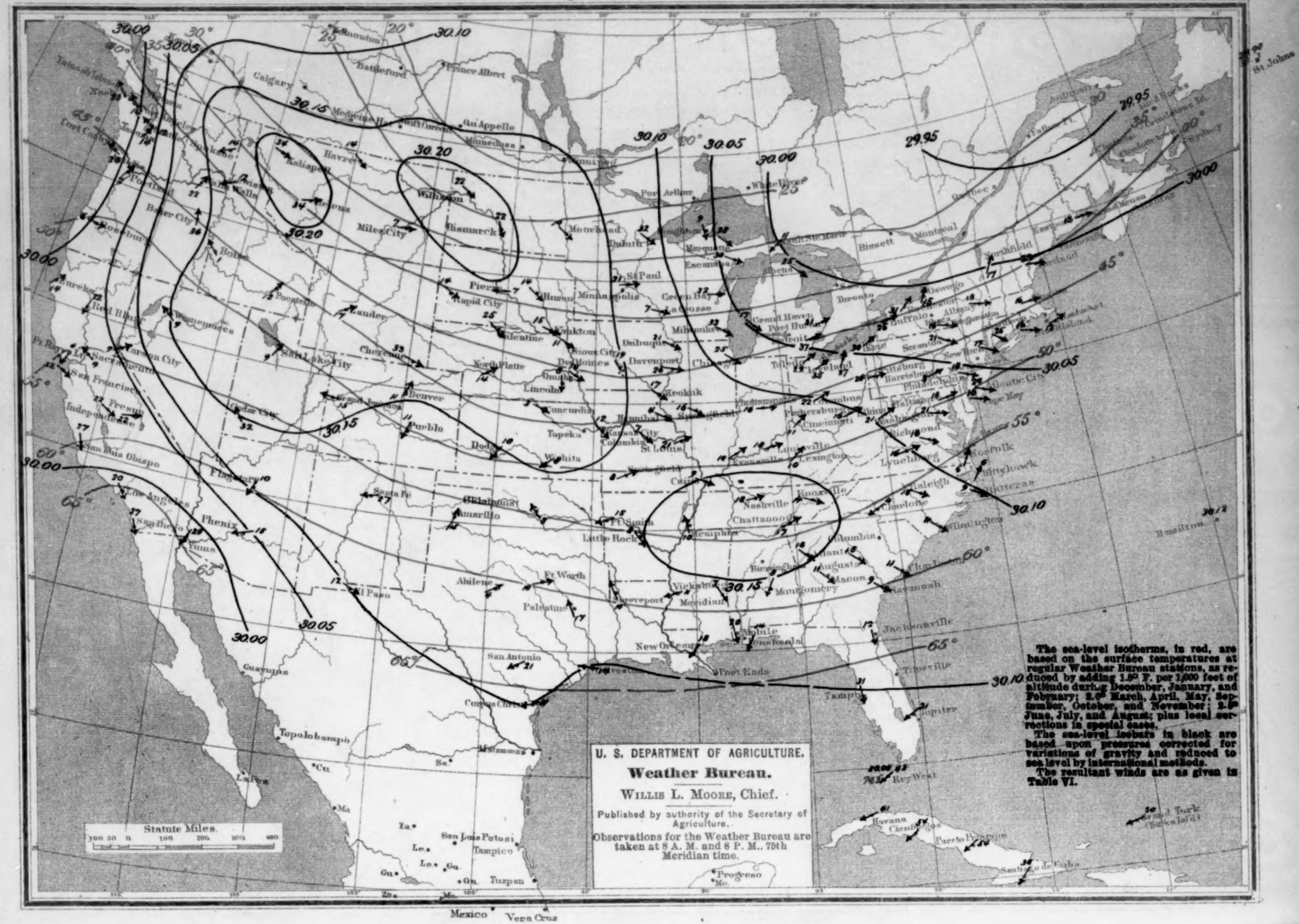

Chart V. Hydrographs for Seven Principal Rivers of the United States. November, 1900.

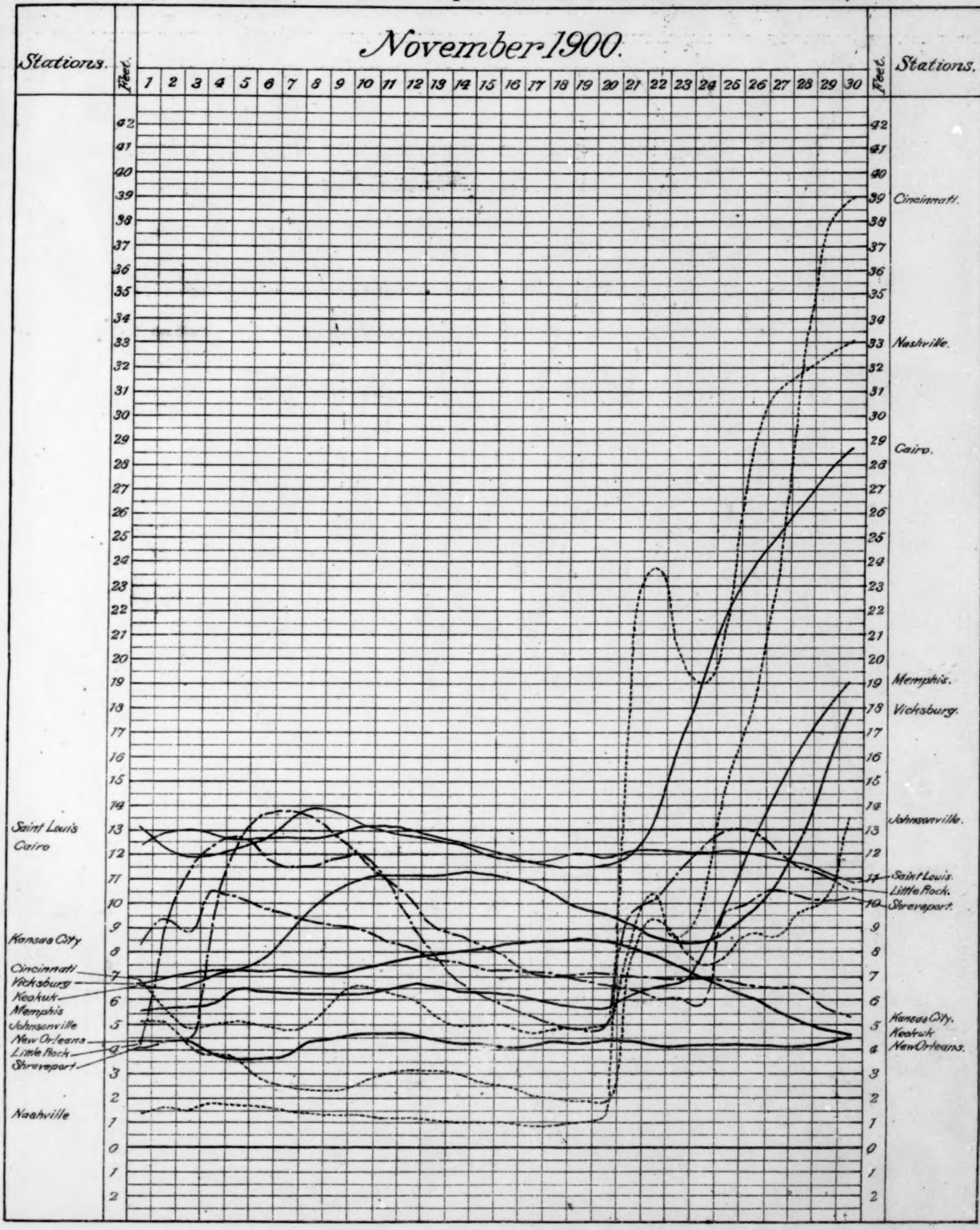

Chart VI. Surface Temperatures; Maximum, Minimum, and Mean. November, 1900.

Chart VII. Percentage of Sunshine. November, 1900.

Chart VII. Percentage of Sunshine. November, 1900.

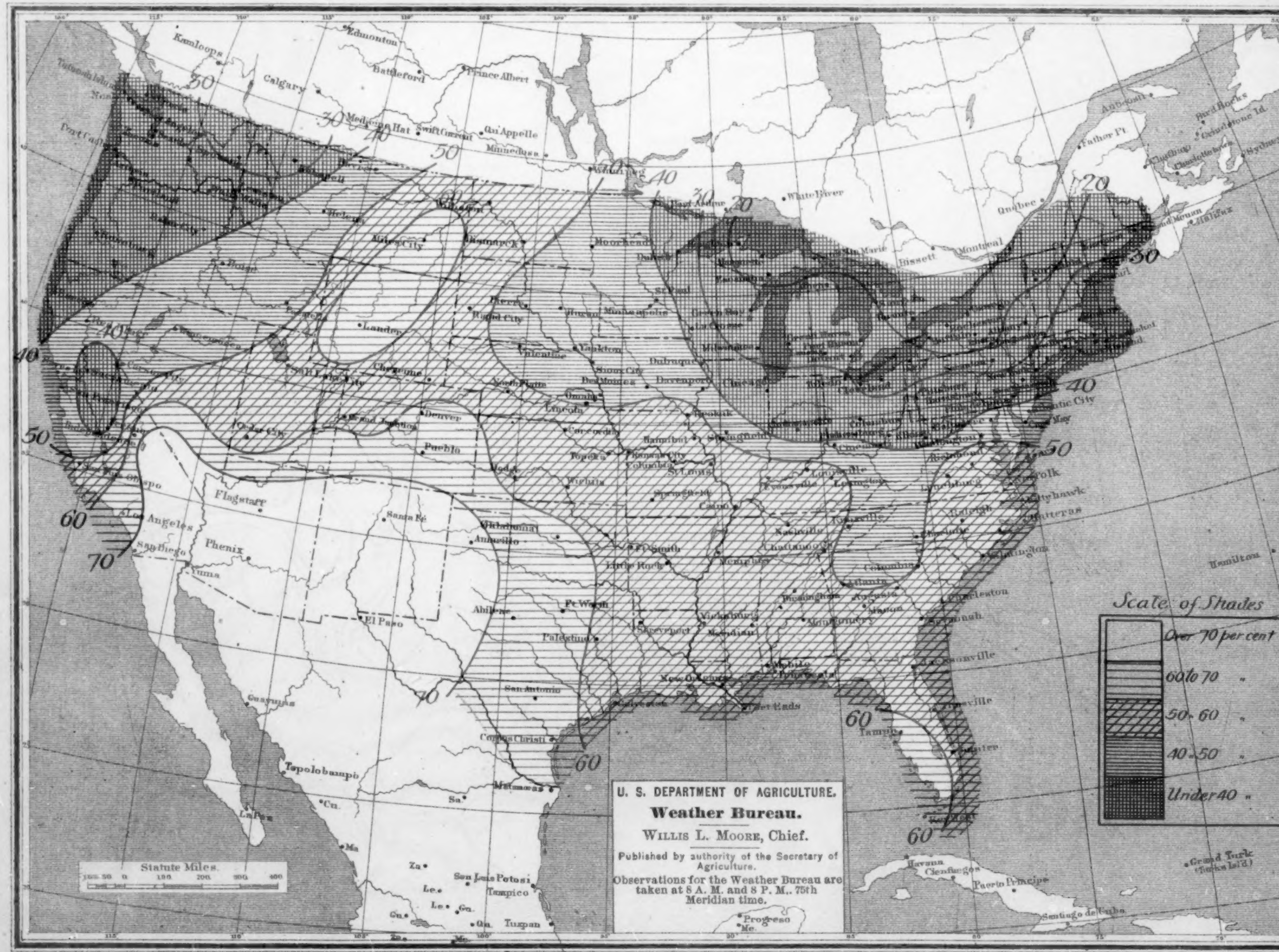

Chart VIII. Total Snowfall for November, 1900.

Chart IX. Depth of Snow on Ground November 30, 1900.

Chart IX. Depth of Snow on Ground November 30, 1900.

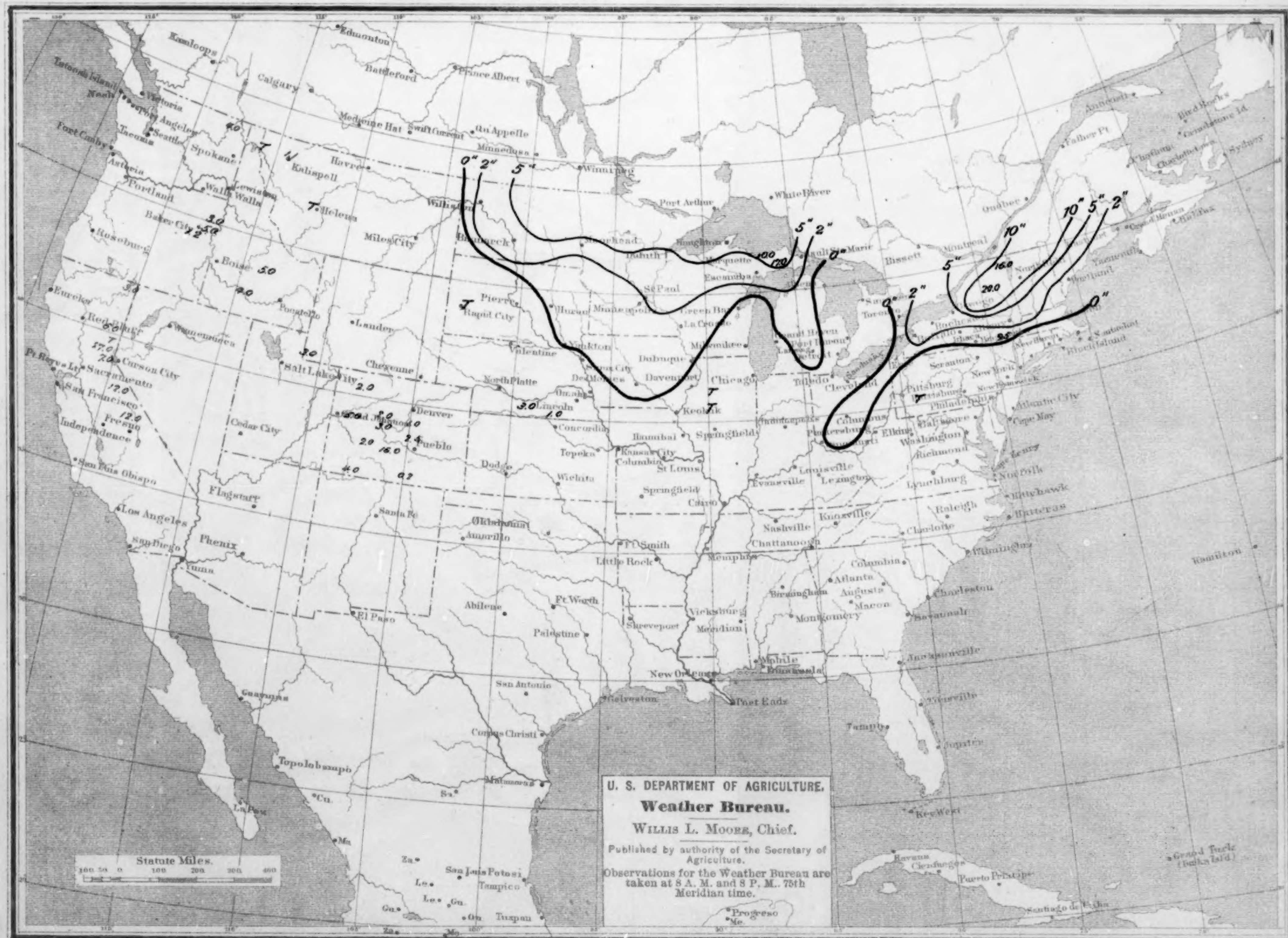

Chart X. West Indian Monthly Isobars, Isotherms, and Resultant Winds. November, 1900.

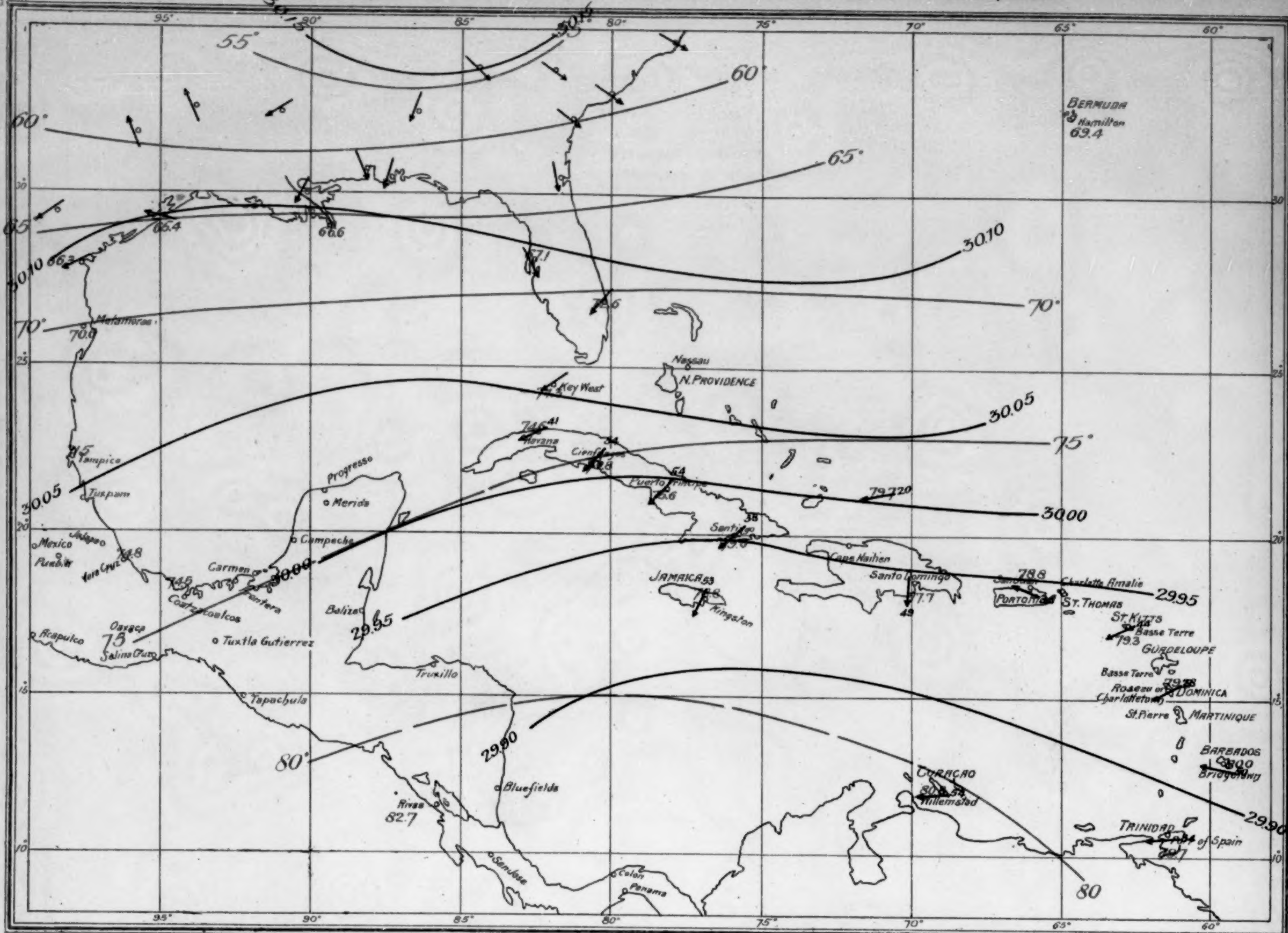

Plate I.

FIG. 1.—Morning fog over valleys. View from U. S. Weather Bureau Observatory, Mount Tamalpais.

FIG. 2.—Lifted fog. Height above ground about 500 meters. View from U. S. Weather Bureau Observatory, Mount Tamalpais.

Plate II.

Fig. 3.—Sea fog pouring over Sausalito Hills and through Golden Gate.

Fig. 4.—Fog waves. View from U. S. Weather Bureau Observatory, Mount Tamalpais.